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# FINAL WHITE RIVER DAM PROJECT

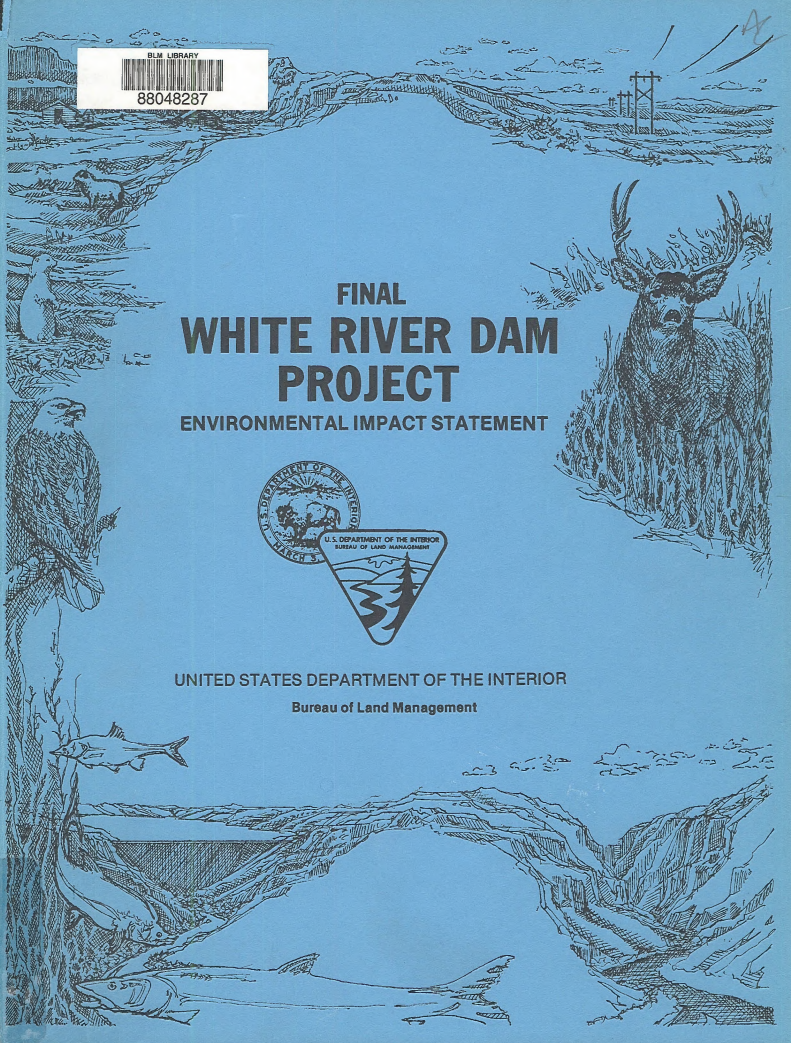
ENVIRONMENTAL IMPACT STATEMENT



U.S. DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

UNITED STATES DEPARTMENT OF THE INTERIOR

Bureau of Land Management





# United States Department of the Interior

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## BUREAU OF LAND MANAGEMENT

### VERNAL DISTRICT OFFICE

170 South 500 East  
Vernal, Utah 84078

Dear Reader:

The Final Environmental Impact Statement (EIS) is furnished for your information and use. This EIS analyzes the effects of the State of Utah's proposal to construct the White River Dam.

This Final EIS reflects modification to the Draft as a result of comments received from hearings and public comments.

This Final EIS is not the decision document. The final decision will be based on the analysis contained in this Final EIS along with public concerns and comments, and other multiple-use resource objectives or programs applicable to the White River area. No action will be taken for at least 30 days following the filing of the Final EIS with the Environmental Protection Agency and distribution to the public. During this period, any comments should be submitted in writing to:

Lloyd H. Ferguson, District Manager  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

801-789-1362

Sincerely,



District Manager

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**DEPARTMENT OF THE INTERIOR**

**FINAL ENVIRONMENTAL IMPACT STATEMENT**

**OF THE**

**WHITE RIVER DAM PROJECT**

**Prepared By**  
**BUREAU OF LAND MANAGEMENT**  
**DEPARTMENT OF THE INTERIOR**

*Roland H. Robinson Jr.*

UTAH STATE DIRECTOR

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WHITE RIVER DAM PROJECT  
ENVIRONMENTAL IMPACT STATEMENT

( ) DRAFT (X) FINAL

Lead Agency

U.S. Department of the Interior, Bureau of Land Management

Cooperating Agencies

U.S. Department of Agriculture  
Rural Electrification Administration  
U.S. Department of the Interior  
Fish and Wildlife Service  
Bureau of Reclamation  
Geological Survey  
U.S. Environmental Protection Agency  
U.S. Department of the Army, Corps of Engineers  
State of Utah  
Office of the State Planning Coordinator  
Utah Division of State History  
Utah Division of Wildlife Resources  
Utah Division of Water Resources  
Utah Division of Parks and Recreation  
Utah Division of Water Rights (State Engineer)  
Uinta Basin Energy Council  
Uintah County Commission

Abstract

This EIS assesses the environmental consequences of five alternatives designed to supply water for energy development, including oil shale, in Uintah County, Utah. The alternatives involve the Utah Division of Water Resources proposal (1) to construct the White River Dam, reservoir, and hydroelectric power plant; also, (2) No Action; (3) pumping from the White River and augmenting from Hell's Hole Canyon Dam; (4) pumping from Green River; (5) pumping from White River and supplementing with water pumped from the Green River. This Final EIS may result in amendments to the Bonanza and Rainbow Management Framework Plans.

The major environmental topics discussed are related to minerals, geology, paleontology, soils, water, vegetation, wildlife, threatened and endangered plant and animal species, recreation, cultural resources, land use, and socioeconomics.

For further information regarding this EIS or proposed alternative actions contact:

Mr. Dee R. Ritchie, Team Leader  
Bureau of Land Management  
150 East 900 North  
Richfield, Utah 84701  
Telephone (801) 896-8221 (FTS 584-8011)

Date by Which Comments on the EIS Must Be Received:

The BLM decisions on use of public lands for this project will not be made until at least 30 days after the EPA Final EIS Notice of Availability has appeared in the Federal Register. During that 30-day period, written comment on the content of this Final EIS and the proposed MFP amendments mentioned above will be accepted by Lloyd H. Ferguson, BLM Vernal District Manager, 170 South 500 East, Vernal Utah 84078. Any written comments received will be considered in the BLM decision-making process.

Date EIS Made Available to EPA and the Public:

Draft: November 26, 1980  
Final: June 6, 1982



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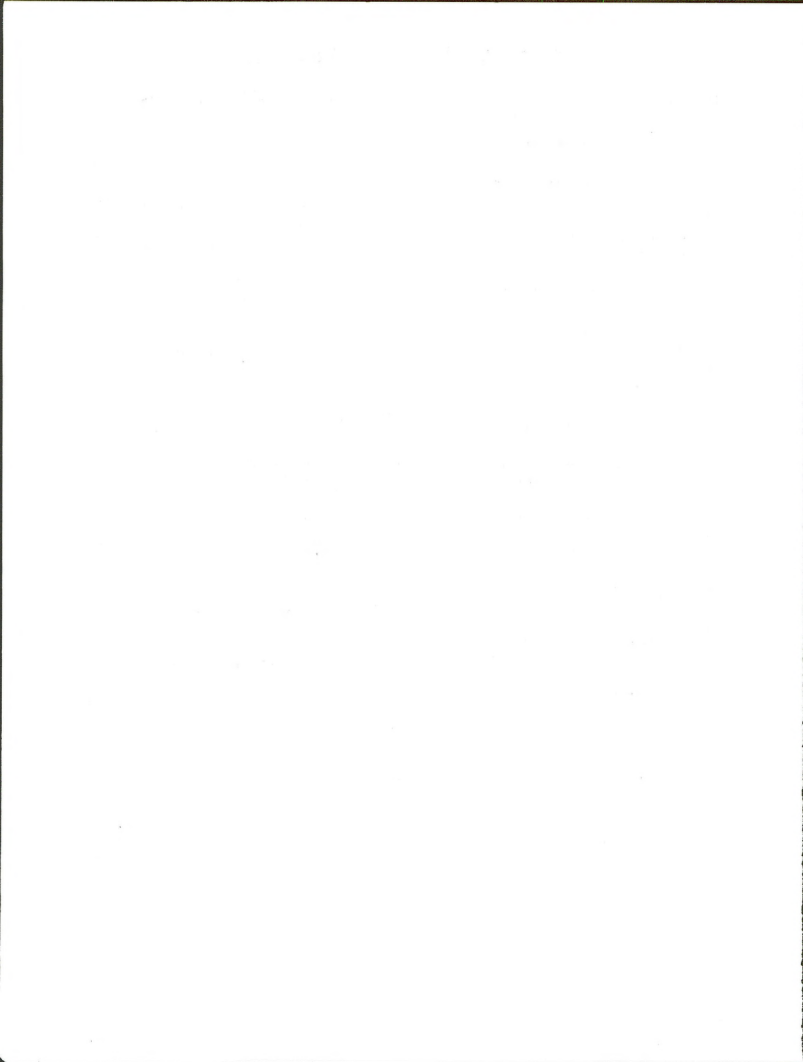
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# SUMMARY

## INTRODUCTION

The Utah Division of Water Resources filed a right-of-way application with the Bureau of Land Management (BLM) on August 4, 1975. The applicant has applied for 3,402 acres (1,377 ha) of public land administered by the BLM to facilitate construction of an earthen dam across the White River and create a 11.7-mile-long reservoir (19 km) (13.5 river miles) with 1,980 surface acres (801 ha). The reservoir would have an active storage capacity of 70,700 acre-feet and a sediment reserve capacity of 38,550 acre-feet, for a total of 109,250 acre-feet. Also proposed are a 15-megawatt (MW) hydroelectric power plant, power transmission system, recreational facilities, and access roads. The proposed White River Dam Project would be located 40 miles (64 km) southeast of Vernal, in Uintah County, Utah. The basic purpose of the project would be to supply water for energy development with potential users as follows:

The White River Shale Project, sponsored jointly by three companies (Phillips Petroleum, Sunoco Energy Development, and Sohio Petroleum), has an estimated water requirement of about 28,000 acre-feet per year at the 100,000 barrels-per-day (bpd) oil production level. The companies' oil shale tracts of about 10,000 acres (4,047 ha) are on leased Federal land located adjacent to and south of the proposed White River Dam.

Five companies, Tosco, Paraho, Syntana-Utah (Phase I), Magic Circle Energy, and Enercor-Mono, which expect to reach their projected production by 1990, have a combined water requirement of approximately 25,000 acre-feet. This amount, combined with the White River Shale Project's projected development, would bring the annual depletion from the White River Dam Project up to 53,000 acre-feet by 1990 (US Department of Interior [USDI], BLM 1982). Ultimate depletion (consumptive use) from the project could be as much as 75,000 acre-feet per year, as a result of the partial refill capacity of the 70,700 active storage capacity.

Also, a small quantity of water (4-5 cubic feet per second [cfs]) would be withdrawn from the reservoir to replace the Town of Bonanza's existing supply for domestic use and gilsonite processing. In addition, water may be needed for other energy development projects which may occur in this region of high oil shale and tar sand development potential.

The project proposal was explained to the public in accordance with Council on Environmental Quality regulations implementing the National Environmental Policy Act of 1969, as amended (NEPA).

A notice was published in the *Federal Register*, September 17, 1979 announcing the October 1979 public scoping meetings which were held at the BLM Vernal District Office and BLM State Office in Salt

Lake City. Since these scoping meetings, numerous contacts have been made with Federal, State, local agencies and others to solicit their concerns and expertise. A Draft EIS was then prepared which included issues identified during public hearings and comments.

Several issues and environmental concerns were identified by the various individuals and groups. Those of most significance are noted below:

Three species of rare endemic fish (Colorado squawfish, humpback chub, and bonytail chub) have been observed in portions of the White River in Utah and are Federally listed as endangered. The razor-back sucker, currently listed as a sensitive species, has been reported and may occasionally enter the White River from the Green River. One sensitive plant species, *Penstemon albidiflorus*, occurs in the reservoir impoundment area. Other threatened, endangered, and sensitive species found within the region include the bald eagle, golden eagle, peregrine falcon, and Uinta Basin hookless cactus. Early in 1980, BLM initiated Section 7 consultation on these species with the US Fish and Wildlife Service (FWS). The Utah Division of Water Resources requested on August 13, 1980, that BLM extend the consultation period on this project required under the Endangered Species Act. Therefore, the FWS has provided a formal Biological Opinion regarding the impacts of the project on threatened and endangered species (included as Appendix 4 in this Final EIS).

The Nation's energy situation relates to the White River Dam Project in several ways. There are strong views which indicate that increased energy production from oil shale and tar sand would significantly assist in reducing our dependency upon foreign oil while helping to satisfy regional needs. Water is required in the conversion processes of oil shale, electrical power generation, and other energy development projects.

The Utah Division of Water Resources wants to provide water for energy development by using a portion of the 1965 water right filing held by the Utah Board of Water Resources on the White River.

Water has become an important issue in eastern Utah because of expanding needs, its limited availability, problems associated with water quality, and the potential impacts of cumulative water depletions to water-related ecosystems.

The Ute Indian Tribe of Fort Duchesne, Utah has prime water rights on the White River under the Winters Doctrine with a potential to irrigate 12,833 acres (5,193 ha) of land (McKee and Morgan 1978).

Depletions of river flows along with water return from increased acreages of irrigated land cause concern over raised salinity concentrations in the Green River and downstream into the Colorado River.

## SUMMARY

Current recreational and scenic uses of the White River in Utah are important to a small but growing number of users, particularly canoeists.

The loss of about 13.5 river miles (22 km) and the associated native aquatic ecosystem is considered important by a segment of the public. Also, the inundation of 995 acres of riparian vegetation is considered important terrestrial wildlife habitat.

In preparing this environmental impact statement (EIS), BLM has noted several interrelated projects which would contribute to cumulative impacts to the region and the Upper Green River system.

Other related projects on the Upper Green River and its tributaries include the Juniper-Cross Mountain Dams on the Yampa River, the Cheyenne Stage II Water Diversion Project on the Little Snake River (a tributary of the Yampa), and the Central Utah Project on the Duchesne River system. Several related synfuel projects located in the Uinta Basin are also being covered in a separate EIS.

There is at present no specific compact between Colorado and Utah concerning the White River. Therefore, allocation for emerging water-consuming projects is not presently subject to any special interstate arrangement other than the overall provisions of the Colorado River Basin and Upper Colorado River Basin Compacts.

### ALTERNATIVES

Several dam sites on the White River in Utah were investigated by the Utah Division of Water Resources using a screening process, and then dropped from further consideration because the White River Dam site best met the state selection criteria, including engineering feasibility.

In response to NEPA, alternatives to the White River Dam Project have been identified and analyzed by BLM in this EIS. The proposed White River Dam Project is identified as Alternative 1, and the other alternatives are as follows:

#### Alternative 2: No Action

This is a mandatory alternative required by NEPA. Under this alternative, BLM would not approve the use of Federal lands for the applicant's proposal or the other alternatives.

#### Alternative 3: Pumping From the White River and Augmenting From Hell's Hole Canyon Dam

The main water supply for energy development would be direct pumping of 70,000 acre-feet annually from the White River by individual developers in Utah

during normal water years. The 70,000 acre-foot per year figure was selected for the analysis of alternatives because it was the approximate active capacity of the proposed reservoir.

The project alternative would be the construction of the potential Hell's Hole Canyon Reservoir with a storage capacity of 25,000 acre-feet. This side canyon reservoir would be filled by pumping from the White River during high flows. During periods of low flows in the White River, releases would be made from the reservoir to augment natural flows in the river and thus provide a uniform water supply for energy development projects. Releases from storage would be needed approximately 20 percent of the time under present conditions; future potential water depletions from the White River in Colorado would increase the frequency of need for water releases from Hell's Hole Canyon Reservoir.

#### Alternative 4: Pumping Water From the Green River

This alternative would provide 70,000 acre-feet of water pumped continuously from the Green River to the vicinity of the proposed White River Dam site. Water would be released from Flaming Gorge Reservoir which would flow downstream about 120 miles (193 km) to a diversion point near Walker Hollow, about 5 miles (8 km) downstream from Jensen, Utah. A river pumping station, settling pond and sluiceway, two high-lift pumping stations, and approximately 28 miles (45 km) of buried pipeline would convey water for distribution to individual water users along the White River.

The U.S. Bureau of Reclamation (USBR) has authority to contract for use of water from the Flaming Gorge Reservoir. This would be subject to negotiation according to a report entitled, "Alternative Sources of Water for Prototype Oil Shale Development, Colorado and Utah," (USDI, Bureau of Reclamation 1974.) Although it is physically possible to use water from Flaming Gorge Reservoir, the feasibility of this water source is contingent on negotiation between USBR and the Utah Division of Water Rights. It is the opinion of the Utah Division of Water Rights (State Engineer) that the USBR does not have any water which can be contracted for outside of that which is already allocated to the individual units of the Central Utah Project and water that would be withdrawn from the Green River to supply the Indian lands on the Leland Bench Project. According to Dee C. Hansen, Utah State Engineer (1981):

It would be the view of the State Engineer that individuals or companies must make application with the State Engineer to appropriate water and if it is determined by the State Engineer that there is in fact unappropriated water available that that

## SUMMARY

application could be approved but the proposed use would not come as a result of a contract with the Bureau of Reclamation unless the Bureau were to change the plans of the Central Utah Project and delete some of those features and then file a change application changing the uses that were initially considered part of the Central Utah Project to cover a new project such as oil shale development.

### **Alternative 5: Pumping Water From the White River and Supplementing With Water Pumped From the Green River**

The main water supply, 70,000 acre-feet, would be pumped from the White River by individual water users during normal river flow years. The alternative project would be a pipeline similar to that in Alternative 4. During dry years, water would be released from Flaming Gorge Reservoir and pumped from the Green River to supplement White River flows. The main difference between Alternatives 4 and 5 would be the amount and frequency of pumping from the Green River.

## **ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ALTERNATIVE ACTIONS**

### **Alternative 1: White River Dam and Reservoir**

Oil shale would probably not be available for mining or production during the project's life on 1,980 acres (801 ha) inundated by the reservoir. A depletion of 75,000 acre-feet of water from the White River would result in an increase in salinity at Imperial Dam on the Colorado River of 4.1 milligrams per liter (mg/l).

The reservoir would inundate about 995 acres (403 ha) of riparian habitat, while another 4,575 acres (1,851 ha) of riparian habitat, located downstream from the proposed dam, would be changed because of reduced river flows. Some wildlife would be displaced or lost (i.e., up to 176 beaver and 200 deer).

The native aquatic ecosystem would be lost within 13.5 river miles (22 km) of the White River, while about 50 river miles (80 km) of habitat would be altered below the dam. A partial loss of native fauna could occur in the lower 10-20 miles (16-32 km) of the White River. Blockage of the channel and changes in water quality would result in changes of habitat for the Colorado squawfish, bonytail chub, humpback chub, razorback sucker, and other fishes. However, with

implementation of the operation procedures and conservation measures described in the FWS Biological Opinion, the White River Dam Project would not likely jeopardize the continued existence of the endangered fishes.

The cumulative loss of flows in the Upper Green River Basin from this project and other proposed water developments in the Green River system could adversely affect the existing habitat of the Colorado squawfish.

The loss of stream-canoeing opportunity would occur in the White River Canyon through the area which would be inundated and downstream depending upon flow releases.

### **Alternative 2: No Action**

Current management levels would be maintained for the Federal lands along the White River in Utah.

Oil shale developers would have to seek other water supply methods and processing might be delayed because of the lack of a reliable water source in the vicinity of the proposed White River Dam Project.

Terrestrial and aquatic ecosystems would remain essentially undisturbed on the Federal lands along the White River Canyon in Utah, at least to the extent that they would not be impacted by water developments related to the White River Dam Project.

Demands for water are expected to expand because of the increased interest in synthetic fuels, including those derived from oil shale. Although advances in technology may continue to reduce quantities of water needed to process oil shale, there would still remain a need for water in the retorting processes, dust control, surface rehabilitation, and other activities.

### **Alternative No. 3: Pumping From the White River and Augmenting From Hell's Hole Canyon Dam**

About 260 acres (105 ha) of oil shale would be inundated. The depletions of 70,000 acre-feet would cause salinity to increase 4.1 mg/l at Imperial Dam on the Colorado River. The cumulative loss of flows in the White River from this alternative and potential future projects upstream in Colorado could reduce the White River as Colorado squawfish habitat. Also, water depletions from the White River (70,000 acre-feet per year) would alter the aquatic ecosystem below the withdrawal point.

Cumulative impacts from this alternative and other proposed water developments in the Green River system could reduce flows sufficiently to adversely affect the continued existence of the Colorado squawfish, bonytail chub, humpback chub, razorback sucker, and

## SUMMARY

other fishes. However, if this alternative were selected, Section 7 consultation with the FWS would be reinitiated.

### Alternative No. 4: Pumping Water From the Green River

The Green River would be depleted by 70,000 acre-feet per year which would increase salinity at Imperial Dam by 4.1 mg/l.

The cumulative loss of water from this project and other proposed projects could adversely affect the continued existence of the Colorado squawfish. However, the adjustment in flows by compensating releases from Flaming Gorge Reservoir would avoid or minimize impacts to the squawfish, bonytail chub, humpback chub, razorback sucker, and other fishes through changes in river flows. If this alternative were selected, Section 7 consultation with the FWS would be reinitiated.

### Alternative No. 5: Pumping Water From White River and Supplementing With Water Pumped From the Green River

In most years, the majority of water (70,000 acre-feet per year) would be pumped directly from the White River for energy development. Supplemental supplies of water from the Green River would be needed approximately 20 percent of the time. Environmental impacts would relate primarily to the overall effect of water depletion. Salinity would increase 4.1 mg/l at Imperial Dam on the Colorado River. The cumulative loss of water from this alternative, combined with depletions from future projects in the White River drainage, could cause a change in the native ecosystem. If this alternative were selected, Section 7 consultation with the FWS would be reinitiated.

## COST ESTIMATE AND ENERGY ANALYSIS

A rough water supply cost comparison indicates that Alternative 1 (White River Dam and Reservoir) would be least expensive (\$32 per acre-ft/yr) while Alternative 4 (Pumping From Green River) would be greatest (\$118 per acre-ft/yr). Energy analysis shows that Alternative 1 and Alternative 3 (Hell's Hole Canyon Dam) would have the lowest energy requirements for construction (7x10<sup>11</sup> British thermal units [Btu]); however, Alternative 1 would be the only producer of energy (1.1x10<sup>10</sup> Btu per year) during operation, based on an annual 31.4 million kilowatts generated from the power plant (BIO/WEST 1979).

## UNRESOLVED ISSUES

Future water allocations in the White River remain unresolved in several respects:

A proposed water compact between the State of Utah and the Ute Indians of the Uintah and Ouray Reservation has not been ratified by the Tribe. The Ute Indians, under the Winters Doctrine, are entitled to irrigate up to 12,833 acres (5,193 ha) of land within the Reservation, which would be diverted from the White River.

A Uintah and Ouray Indian Reservation boundary dispute has been in lengthy litigation contesting jurisdiction of lands east of the existing reservation, including the site of the White River Dam (Hawkins 1979).

The eventual consumptive use of water from the White River and its tributaries in Colorado has not been determined.

The White River Dam Project as a water supply for energy development for oil shale, tar sand, and power generation is an issue between the States of Utah and Colorado. The amount of water that can be made available for the project from the White River in Utah depends on the amount of future water development and the amount of water that would flow from Colorado into Utah. Controversy has arisen over assumptions on "reasonable" levels of future water use for the White River Dam Project. The Colorado River Water Conservation District contends that Colorado can fully utilize the entire flow of the White River. Utah's position is that a guaranteed source of water for the entire life of the project is available and future upstream use would not reduce the amount of water available for the White River Dam Project. Studies by Fields (1975) and Western Engineers (1979) concluded that, even during drought years with liberal assumptions of upstream water development and a minimum annual average 223,000 acre-feet at the USGS Gage near Watson, the White River Dam Project could supply water for energy development and power generation.

It is not known whether Colorado would be obligated to honor a water right granted to the Ute Tribe in Utah by the Winters Doctrine, a Federal decree given in 1882. The Winters Doctrine does not specify a definite amount of water but ensures that the Ute Tribe in Utah has a right to substantial quantities of irrigation water from the White River. The amount of water is not yet agreed upon by the Ute Tribe and State of Utah. The priority date of the Ute water rights is not firmly established, but will most likely be either 1882 or 1948. Utah is presently meeting with the Tribe to reach an agreement on Tribal water needs and involve them in the White River Dam Project.

The Ute Tribe is entitled to water from the White River to satisfy Winters Doctrine claims. It is likely that Winters Doctrine claims would be chargeable to

## SUMMARY

Utah's apportionment of Colorado River Basin waters because the Reservation is within Utah. This would be consistent with the precedent established by the United States Supreme Court in *Arizona v. California*, 373 U.S. 546, 83 Sup. Ct. 1468 (1963). Thus, while the water probably would not be chargeable to Colorado, it does not necessarily follow that Colorado would be free to take action within its boundaries that would prevent the Tribe from satisfying any Winters Doctrine entitlements. It is doubtful that the courts would permit use of water in Colorado that would nullify legitimate Winters Doctrine entitlements of Indian tribes located in Utah. Of course, the precise issue has not been considered by the courts and, until or unless it is, or the matter is otherwise resolved, uncertainty regarding it will continue.

As competition for use of water from the White River increases and if a dam is constructed as proposed, it is probable that some division of the water from the river between the two states will be made, either by compact or judicial determination. Because the White River flows partly in Utah and is a part of the Colorado system, and because Utah is entitled to the use of a fixed amount of water from the system under the Upper Colorado River Basin Compact, it is doubtful that Colorado could consumptively use all of the water of the White River. At present, however, each State's specific entitlements in the river are uncertain and will have to wait for further efforts to determine them.

The BLM has concluded that the White River Dam Project could provide a reliable source of water for energy development in the Uinta Basin for the expected life of the project.

The habitat requirements and other biological needs of the Colorado squawfish are not fully known.

The FWS has recently completed 1 year field studies along the White River to better understand the requirements of this endangered fish. Conclusions discussed in this Final EIS reflect available information and the professional judgement as contained in the FWS formal Biological Opinion.

The FWS indicated that with the implementation of the dam operating procedures and conservation measures described in the Biological Opinion, the White River Dam Project would not seriously impact the region's aquatic ecosystem or the endangered native fish species. The major environmental concern appears to be the cumulative impacts of this project and others proposed within the Upper Green River system.

According to the USBR, water is available from the Flaming Gorge Reservoir for beneficial consumptive uses downstream. However, contracts for the sale of this water would require the approval of the Utah Division of Water Rights (State Engineer) and the Secretary of the Interior. Other institutional requirements would also have to be met.

The USBR has stated that non-Colorado River Storage Project (CRSP) developments in the Upper Colorado River Basin should provide their own mitigation for impacts caused to endangered fishes, and the CRSP system should not be expected to or necessarily relied upon as the mitigation source.

Other areas of controversy involve such issues as selection of proper dam sites, feasibility of using groundwater for oil shale development, and determination of accurate sedimentation rates.



# CHAPTER 1

## THE PURPOSE AND NEED OF THE PROPOSED ACTION

### INTRODUCTION

In accordance with the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190, 1970), the Bureau of Land Management (BLM) has prepared this document in response to the filing of a right-of-way application by the Utah Division of Water Resources on August 4, 1975. The applicant has applied for 3,402 acres (1,377 ha) of public land administered by the BLM to construct an earthen dam across the White River which would create a reservoir. About 2,377 acres (962 ha) are within the project area, and about 882 acres (357 ha) identified for dam core materials are located north of Bonanza, Utah. Also proposed are a hydroelectric power plant, a power transmission system, recreational facilities, and access roads. The proposed White River Dam Project would be located about 40 miles (64 km) southeast of Vernal, in Uintah County, Utah (Figure 1-1).

This chapter explains the purpose and need of the proposed project, the scoping processes that were used to identify significant environmental issues and concerns of people, and interrelated projects which could have cumulative effects. Government actions required to authorize the project are in Appendix 1. Appendix 2 contains an English-metric conversion table for units used in this environmental impact statement (EIS).

### PURPOSE AND NEED OF THE PROPOSED PROJECT

The basic purpose of the proposed White River Dam Project would be to supply water for energy development, principally related to oil shale.

The need for reservoir storage is substantiated by Western Engineers (1979) who concluded that: "In most years an adequate water supply exists, but in years like 1977-1978, there are periods when no water will be available without hold-over reservoir storage."

Within the last several years, various companies with financial grants from the Department of Energy (DOE) have been researching the feasibility of oil shale development. Several other companies on their own are now making plans for commercial operations (US Department of Interior [USDI], BLM 1981). The tentative plans for oil shale development with White River water in Utah are as follows:

1. Enercor and Mono Power Company plan to mine and retort tar sand on about 10,000 acres in the southeastern section of Uintah County and northern Grand County. A demonstration module would be located at Rainbow Mine (Rainbow Proposal), and the other modules would be located at

Cedar Camp Mine (P.R. Springs Proposal). The demonstration module would produce 5,000 barrels per day (bpd). If successful, nine additional 5,000-bpd modules would be constructed near P.R. Springs for a total synthetic crude production of 50,000 bpd.

2. The Magic Circle Energy Corporation proposes to develop the 6,500-acre Cottonwood Wash Oil Shale Project located approximately 40 miles south of Vernal, Utah. Oil shale from an on-site mine would be processed to produce approximately 31,500 bpd.

3. The Paraho Development Corporation plans to design, construct, and operate a 1,412-acre Paraho-Ute oil shale facility located in northeastern Utah in Uintah County, approximately 50 miles from Vernal. The capacity of the Paraho-Ute oil shale facility would be 42,000 bpd of hydrotreated shale oil.

4. Syntana-Utah (a joint venture of Quintana Minerals Corporation and Synthetic Oil Corporation) has proposed to construct an oil shale production facility on about 2,100 acres near Bonanza, Utah. The facility would initially produce 16,500 bpd of shale oil (Phase I), with subsequent production (Phases 2 and 3) reaching 50,000 bpd as the site is expanded.

5. Tosco Development Corporation has proposed to develop the Sand Wash Oil Shale Project on 14,000 acres located in the central Uinta Basin, approximately 30 miles south of Vernal, Utah. Plans are to process and transport 48,300 bpd of upgraded shale oil.

The White River Shale Project is developing about 10,000 acres (4,047 ha) of oil shale on two tracts leased from the BLM. These two tracts, designated as Ua and Ub, are located adjacent to and south of the proposed dam. Three companies, Phillips Petroleum, Sunoco Energy Development, and Sohio Petroleum, have joined together to establish and implement a plan for the combined development of the tracts. These companies have estimated a 100,000 bpd oil production level.

The White River Shale Project's detailed development plan contains the following variables related to water use:

1. There is a wide variation in water required for cooling, dust suppression, and compaction of the processed shale resulting from the various retorting systems. The actual water use for these purposes would depend on the final selected retorting system and operating experience.

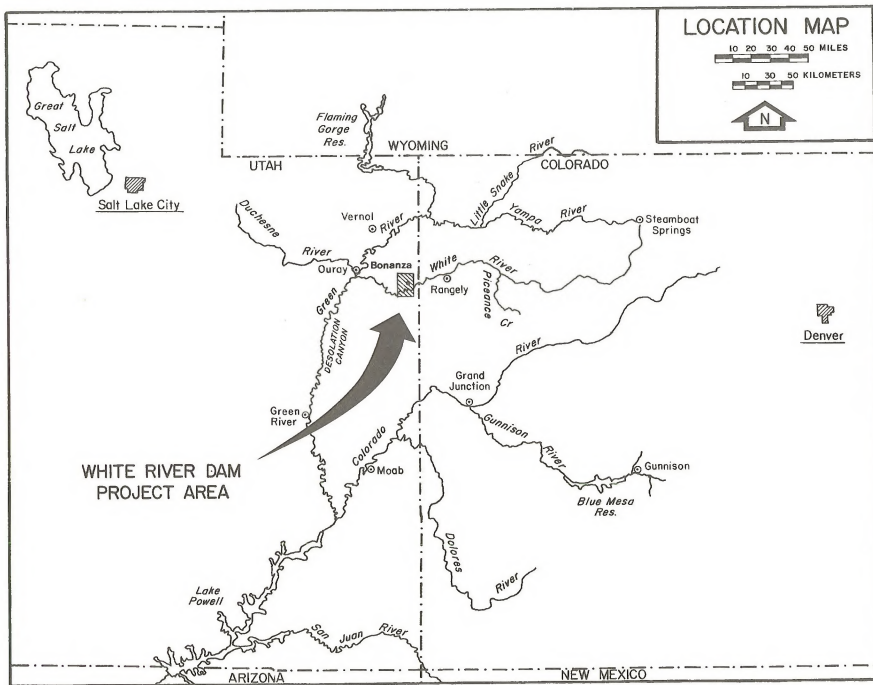


Figure 1-1  
WHITE RIVER DAM PROJECT AREA REGIONAL LOCATION MAP

## PURPOSE AND NEED

2. Regardless of the selected retorting system, the water requirements shown for an acceptable degree of dust control and shale compaction are only estimates. There is a substantial tradeoff between water use and energy production.

The Ute Indians have a right to annually divert water from the White River in Utah (Winters Doctrine) to irrigate lands near Ouray, Utah. This entitlement has been estimated to be 61,598 acre-feet per year to irrigate 12,833 acres of land (refer to Appendix 3). A recent economic study of the Ute Indian Irrigation Project suggested that irrigation of Ute lands would not be economically feasible and that the Ute Tribe may consider selling or leasing a portion of their water rights for industrial use (McKee and Morgan 1978). The Ute Tribe is currently analyzing alternatives toward development of an integrated program of water usage.

A small quantity of water (4 to 5 cfs [3,000 to 3,600 acre-feet]) would also be withdrawn from the reservoir for the Town of Bonanza's domestic and gilsonite processing uses under this proposal.

In addition to the above known water requirements, additional water may be needed for other oil shale and tar sand developments near the White River. The development stages of these resources varies so much that it is difficult to make accurate projections of the amount of additional water needed; however, the amounts stated below appear to be the maximum requirements.

Table 1-1 shows the estimated water requirements for the oil shale and tar sand development projects mentioned earlier and other miscellaneous uses.

Two other companies, Geokinetics, Inc., and Sohio Shale Oil, propose to use Green River water for oil shale development. However, if water is not available from the Green, these companies could use water from the White River Reservoir. Their projected water needs are 1,000 acre-feet for Geokinetics and 4,000 acre-feet for Sohio.

Based on these projections, the proposed White River Dam Project would not be able to meet all of the projected needs through the year 2000. The BLM has, however, prepared this Final EIS with the understanding that the Utah Division of Water Resources could deplete up to 75,000 acre-feet consumptive use plus approximately 5,500 acre-feet for evaporation from the White River. This would total 80,500 acre-feet. It is projected that the annual depletion from the White River Dam Project would reach 75,000 acre-feet before the year 2000.

## SCOPING PROCESS AND IDENTIFIED ISSUES

Notice was published in the *Federal Register*, Volume 44 No. 181, September 17, 1979, announcing

the schedule of public meetings to identify the issues and alternatives to be analyzed in the EIS concerning this project. Public meetings were held on October 17, 1979, in the BLM Vernal District Office and October 18, 1979, in the BLM Utah State Office, Salt Lake City, Utah.

Since these formal scoping meetings, numerous contacts have been made with Federal, State, local agencies, and others to solicit their concerns and expertise (e.g., Federal Energy Regulatory Commission, US Army Corps of Engineers, Bureau of Reclamation, Bureau of Indian Affairs, Fish and Wildlife Service, Geological Survey, Environmental Protection Agency, Heritage Recreation and Conservation Service, Utah State Division of Wildlife Resources, Utah Division of Parks and Recreation, Utah State Historic Preservation Officer, Uintah County Commissioners, environmental and special interest groups, and individuals).

Numerous issues were identified in the scoping process. A summary of these issues is provided below.

## Threatened, Endangered, and Sensitive Species

Three species of rare endemic fish (Colorado squawfish, humpback chub, and bonytail chub) have been observed in portions of the White River and are Federally listed as endangered. The razorback sucker, currently listed as a sensitive species, has been reported and may occasionally enter the White River from the Green River. One sensitive plant species, *Penstemon albiluvius*, occurs in the reservoir impoundment area. Other officially listed threatened, endangered, and sensitive species found within the region include the bald eagle, golden eagle, peregrine falcon, and Uinta Basin hookless cactus. The Utah Division of Water Resources requested on August 13, 1980, that BLM extend the Section 7 consultation period required under the Endangered Species Act on this project. On February 24, 1982, the US Fish and Wildlife Service (FWS) provided a formal Biological Opinion on the impacts of the proposed project to the threatened and endangered species. The reason for the extension was to allow the FWS additional time to conduct fishery studies on the White River. These studies helped to clarify the importance of the White River to Colorado squawfish and the other endangered fishes. Appendix 4 contains the FWS Biological Opinion and comment letters received from various groups and individuals on the Opinion.

## Energy Development

The Nation's energy situation relates to the White River Dam Project in several ways. There are strong regional and state views that increased energy development would serve regional-national energy needs and that water to support such development is

TABLE 1-1  
Estimated Water Needs From the White River

Company	Estimated Acre-Feet
Tosco Development	9,000
Syntana-Utah	7,000
Paraho Development	3,000
Magic Circle Energy	1,000
Enercor-Mono Power	5,000
White River Shale	28,000
Miscellaneous (Increases in Municipal and Industrial Use)	8,000
Ute Indian Irrigation	62,000

Source: USDI, BLM 1982.

## PURPOSE AND NEED

essential. The proposed water development project or alternatives could be important in support of accelerated energy development in the oil shale region of eastern Utah.

### Local Socioeconomics

It is estimated that approximately 20 to 50 workers would be needed to construct the White River Dam and associated facilities, including the hydroelectric power plant (Bingham Engineering 1982). Preliminary projections indicate that workers would live in existing communities and commute to the job rather than live near the project site. Questions raised include: What changes, if any, are anticipated in terms of local socioeconomic conditions, i.e., quality of life and economic conditions?

### Water

The Utah Board of Water Resources has an objective to develop a part of its water right filing on the White River primarily for energy development. This is an important issue due to growing needs for water, limited availability, problems associated with water quality, potential changes in ground and surface water, and cumulative impacts of water uses and its relationship to ecosystems.

In May 1965, the Utah Board of Water Resources filed to appropriate 250,000 acre-feet from the White River and tributaries for the purpose of mining, drilling, and retorting oil shale and other energy-related projects (i.e., hydroelectric power generation). A water need has been identified for the oil shale processing by the White River Oil Shale Project, Magic Circle Energy, Syntana-Utah, Tosco Development, Paraho Development, and Enercor-Mono Power. The Ute Indian Tribe of Fort Duchesne, Utah, has Winters Doctrine rights on the White River with a potential to irrigate several thousand additional acres of undeveloped land. Concern was expressed that added withdrawal of surface water and return flows from irrigated lands could increase salinity concentrations in the Green River.

### Recreation

Current recreational uses of the White River in Utah include: limited fishing for catfish; hunting for deer, coyote, waterfowl, and upland game birds; and recreational boating including canoeing, particularly during the high flows of early summer. Scenic and primitive values and opportunities for solitude are experienced by some. Access roads provide limited opportunities for camping near the river.

### Other Issues

The impacts of the White River Reservoir on future oil shale processing near the proposed reservoir con-

cerned some people, particularly the potential seepage of water from the reservoir into oil shale bearing formations.

Also of concern were cultural and paleontological values that might be affected by project construction activities and inundation by the reservoir. A historic site, Ignatio Stage Stop, with its remaining rustic buildings, would be inundated by the reservoir.

The White River and adjacent river bottoms supply water, forage, and other needs for wildlife and domestic livestock. The riparian vegetation zones are an essential part of these ecosystems.

A native desert aquatic ecosystem is considered important by some, likewise the possible creation of a recreational fishery is considered important by others. The Colorado River Basin has been greatly altered in the last 75 years. Most of the major tributaries are altered by dams or diversions. The White River and the Yampa River are the only unregulated tributaries of any size remaining in the Upper Colorado Basin. This would suggest that the White River ecosystem is significant and has considerable scientific as well as aesthetic value.

An exploratory oil drill hole located near the White River currently oozes thick crude oil and could be a pollution problem if not properly capped.

Some suggested that the analysis of project needs and alternatives address the issue of water use technology by improved processes that could decrease the amount of water development required in the area. The issue of sedimentation and its effects on the life of the reservoir were also suggested for thorough analysis.

### INTERRELATED PROJECTS

Interrelated projects in various stages of planning are important to the assessment of regional and cumulative impacts. They are briefly noted here.

The Deseret Generation and Transmission Cooperative (Deseret) is composed of six rural electric cooperatives serving owner customers in Utah and contiguous areas of Wyoming, Colorado, Arizona, and Nevada. Deseret is constructing the Bonanza (formerly called Moon Lake) coal-fired steam electric power generating station to begin operation in late 1984.

Two sites within the White River drainage in western Colorado are being investigated by Water Users Association No. 1 of the Colorado River Water Conservation District for water storage. One site is located on the White River near the mouth of Taylor Draw, while the other is located on the White River near the confluence of Wolf Creek.

Other related projects on the Upper Green River and its tributaries include the Juniper-Cross Mountain

## PURPOSE AND NEED

Dams on the Yampa River, the Cheyenne Stage II Water Diversion Project on Little Snake River, a tributary of the Yampa, and the Central Utah Project on the Duchesne River system. Other water projects have been listed for future development in the Upper Green River system. Separate EISs will be prepared for these interrelated projects. The uncertainties of loca-

tions, schedules, and the lack of definite information on future interrelated water projects precludes further assessment of cumulative impacts caused by these projects. However, some impacts are apparent and are discussed in Chapter 4, Cumulative Impacts section.

## CHAPTER 2

# DESCRIPTION OF ALTERNATIVES

### INTRODUCTION

This chapter describes the proposed action and the alternatives for supplying water for oil shale and other development near the White River in Uintah County, Utah (Figure 2-1). The alternatives are:

1. The White River Dam and Reservoir;
2. No action;
3. Pumping from the White River and augmenting with water stored behind Hell's Hole Canyon Dam;
4. Pumping water from the Green River; and
5. Pumping water from the White River and supplementing with water pumped from the Green River.

The White River Dam Project is the proposed alternative of the Utah Division of Water Resources. Other alternatives were developed through the scoping process initiated in 1979 by the Bureau of Land Management (BLM). The description of these alternatives is based on reconnaissance level studies by the United States Department of Interior (USDI), Bureau of Reclamation (USBR) (1974) and by BLM and its consultant, BIO/WEST, Inc., who prepared the Draft Environmental Impact Statement (EIS).

Western rivers, such as the White, have high peak flows during average water years; however, most of the water flows during spring runoff, and flows become very low in late summer and fall. During drought conditions, rivers such as the White are reduced considerably in volume during all months of the year. Therefore, water storage in a reservoir to supply development demands during low flow periods is a requirement of most Western water development.

The White River Dam Project was proposed to meet a water requirement identified by the Utah Division of Water Resources for the White River. During development of other alternatives for this EIS, storage was a prime consideration. Storage for Alternatives 4 and 5 would come from Flaming Gorge Reservoir, a large, existing reservoir on the Green River (Figure 1-1). However, approval for this water use would have to be granted by the Utah Division of Water Rights (State Engineer) and the Secretary of Interior (Utah Division of Water Rights 1981). Storage for Alternative 3 would come from a 25,000 acre-foot reservoir in Hell's Hole Canyon, a side canyon to the White River.

In describing and analyzing the proposed project and alternatives, BLM recognizes two important considerations:

1. The physical and environmental parameters

are based on historical and/or current conditions. This is particularly relevant with respect to White River flows and identified water uses in Colorado and Utah. This means that the proposed project and alternatives are described as they would be operated with historical and/or current river hydrology, as a "first-added" new development of water resources.

2. Future events in the Upper Colorado River Basin, including tributaries such as the White River, could markedly alter parts of the alternative descriptions related to river flows, storage frequencies, sediment loads, and similar system-related items. Although potential future developments are identified in concept, specific quantification of such future events is speculative and essentially impossible to do accurately at this time.

The White River Dam EIS is based on the best information available, quantified to the extent now possible from empirical records, experience, observation, and interpretation of real data. Even so, some assumptions have been necessary and are so stated in the document.

Two criteria were set up for the development of reasonable alternatives to the proposed White River Dam. First, the alternatives would develop 70,000 acre-feet of water per year. Second, the water would be delivered to a point on the White River in the vicinity of the White River Dam. The 70,000 acre-foot figure was used because it was projected in the Draft EIS that the White River Dam and Reservoir could provide 67,000 acre-feet of water as active storage capacity. That figure was rounded out to 70,000 acre-feet for the other alternatives. This figure (70,000 acre-feet) converts to a constant flow rate of 97 cubic feet per second (cfs).

U.S. Geological Survey (USDI, Geological Survey 1980) Watson gage data from the White River, the main water source for Alternatives 1, 3, and 5, indicate that discharges of less than 250 cfs occur 5 percent of the time and that discharges of less than 350 cfs have historically occurred more than 20 percent of the time. To provide 97 cfs for energy development and meet the 250 cfs downstream requirements (see Appendix 3), regulation would be required nearly every year. During the worst case year (1977), 39,000 acre-feet of storage would have been required to supply a total need of 70,000 acre-feet. This was calculated by using instream water from the White River when flows exceeded 250 cfs, but requiring storage water when flows were lower than 347 cfs. When natural flows were lower than 250 cfs, the entire 97 cfs was obtained from storage, and no instream water was used.



Figure 2-1  
REGIONAL MAP FOR THE WHITE RIVER DAM PROJECT AND ALTERNATIVES

## DESCRIPTION OF ALTERNATIVES

It should be noted that irrigation withdrawals in Colorado have increased in recent years and it is anticipated that oil shale development and associated growth in Colorado will deplete from about 90,000 to 172,000 acre-feet per year by the year 2000 (Colorado River Water Conservation District 1979).

The storage capacity of Hell's Hole Canyon Reservoir (Alternative 3) would be approximately 25,000 acre-feet. During periods of extreme drought conditions, this would not be sufficient to supply the full 70,000 acre-foot per year water requirement. This alternative should, therefore, be considered a partial alternative. Based on topography it would be possible to construct a dam in Hell's Hole Canyon to provide 70,000 acre-feet of reservoir capacity. However, this dam would be in excess of 400 feet (122 m) high and it is doubtful that the project would be economical (Bingham Engineering 1981a). Therefore, only the partial alternative was considered.

All of the other alternatives meet the 70,000 acre-foot requirement in "worst-case" situations.

### ALTERNATIVES NOT DISCUSSED

Other alternative means of supplying water were briefly screened for consideration. Several dam sites on the White River and other alternatives were reviewed by Bingham Engineering (1969), consultants to the Utah Division of Water Resources, but were rejected as being less cost effective than the proposed site. Figure 2-2 shows alternative dam sites that were considered. Various alternatives for developing water for oil shale, including the USBR Watson site, were also considered jointly in Utah and Colorado, based on reconnaissance level data gathered by the USBR (1979). However, the other dam sites appeared to offer no environmental advantages over the applicant's proposed site, and were, therefore, not considered in this EIS.

The groundwater supply in the vicinity of the Utah Oil Shale Tracts has been studied by VTN Colorado, Inc. (1975 and 1977), an environmental consulting firm from Denver, Colorado, and the USDI, Bureau of Reclamation (1974). Most investigations thus far have been restricted to the areas of Oil Shale Tracts Ua and Ub, but it can be assumed that groundwater characteristics are relatively consistent across the project area. Approximately 80,000 acre-feet of groundwater is believed to be held in storage in the Bird's Nest Aquifer (VTN Colorado, Inc. 1977 and Bechtel Petroleum, Inc. 1981). The recharge characteristics of the aquifer are not well known, but production of water from the aquifer is considered to be minimal (VTN Colorado, Inc. 1977 and Bechtel Petroleum, Inc. 1981). Water in the Bird's Nest Aquifer, located from 0 to 1,000 feet (0-305 m) below the surface, is unsuitable for domestic, commercial, or agricultural purposes (VTN Colorado, Inc. 1977) because of water quality. Although the quality

varies with locations, it averages 3,000 milligrams per liter (mg/l) total dissolved solids (TDS) and is commonly charged with hydrogen sulfide gas.

The extent of the Bird's Nest Aquifer is unknown. However, the majority of recharge to the aquifer would be by lateral movement from precipitation and runoff intercepted at outcrops. The relatively small surface area of outcrops, the low permeability, and the low structural gradient of the aquifer limit the rate at which recharge can occur (Bechtel Petroleum, Inc. 1981).

The Douglas Creek Member of the Green River Formation lies 900 to 1,000 feet (274-305 m) below the Bird's Nest Aquifer and is potentially usable (Austin and Skogerboe 1970). Water quality taken from several flowing wells averages about 900 mg/l in TDS (VTN Colorado, Inc. 1977). The member appears to contain a reasonable amount of fair quality water, but has a maximum transmissivity capability of about 1,500 gallons/day/foot (Phillips 1980 and Bechtel Petroleum, Inc. 1981). To produce enough water to support oil shale operations, 20-30 wells scattered over several thousand acres would be required to avoid pumping effects of one well upon another (Phillips 1980).

Perhaps the most important aspect of using groundwater as a source of supply is that relatively large rates (70,000 acre-feet per year) of pumping would lead to significant groundwater depletion. Because of slow recharge, this could create a long-term shortage.

The use of groundwater for oil shale or industrial development may be physically possible; however, because of considerations such as cost, water quality, and volume, representatives of the Utah Division of Water Resources do not believe that groundwater is a viable water source at this time. However, groundwater in Colorado could, depending upon hydrogeologic and economic factors, be a potentially significant source of supply for tar sand and oil shale development (Colorado Department of Natural Resources 1979).

If groundwater became a source, general, legal, and institutional considerations would apply, the most important of these being the potential disruption of artesian conditions, reductions in surface flow, and reductions in the discharge of springs (Colorado Department of Natural Resources 1979).

Additional studies on the groundwater supply of the project area would be required to clarify the amount of water available. It is possible that groundwater could be used on a limited basis to augment water pumped from the White or Green Rivers. Groundwater could also supply some of the smaller water users projected for the region. Because of the limitations noted above, groundwater has not been considered a viable alternative in this EIS.

It is possible that a dam on Evacuation Creek,



## DESCRIPTION OF ALTERNATIVES

another White River side canyon, could provide up to 65,000 acre-feet of water storage. This alternative would be similar to the Hell's Hole Canyon Dam, with some site specific differences. Preliminary investigations into this reservoir site indicated water leakage through the Bird's Nest Aquifer was possible, and the site was located over a major portion of Utah Oil Shale Tract Ub. Therefore, due to uncertainties regarding water-holding capabilities and the potential loss of oil shale mining capability, Evacuation Creek was not considered a viable alternative.

### ALTERNATIVE 1: WHITE RIVER DAM AND RESERVOIR

The White River Dam Project components would include:

1. An earth and rockfill dam and reservoir;
2. A hydroelectric power plant;
3. A power transmission system;
4. Recreational facilities; and
5. Access roads.

Since the proposed White River Dam was described in the Draft EIS, the Utah Division of Water Resources continues to refine the engineering details. Consequently, some final dimensions and project details may be slightly different than presented here. BLM has reviewed the changes to date and has found that they do not affect the environmental analysis previously contained in the Draft EIS, except as follows:

1. Uintah County, Utah Department of Transportation, and White River Shale Project are proceeding with plans to upgrade and realign the existing Utah State Highway 45 in the vicinity of Ignatio. This construction would eliminate the need for the new bridge once considered as a part of the White River Dam Project, since the design of the current bridge would be sufficient to accommodate the reservoir. A separate environmental assessment for upgrading and realigning the road and bridge was prepared by the BLM Vernal District in 1981. Consequently, the alternative upstream bridge crossing analyzed in the Draft EIS has been deleted in this Final EIS.

2. The proposed hydroelectric power plant was described in the Draft EIS at a 5- to 8-megawatt (MW) size. A 15-MW power plant, consisting of three 5-MW units is now proposed. Simulated operation studies have been reviewed for the two power plant sizes and the differences in operational effects were found to be minor. No difference in acreage is anticipated in the area occupied by the power plant. In general, the 15-MW power plant would use water on an as-available basis, which would otherwise be spilled with a 8-MW power

plant; therefore, reservoir fluctuations and downstream flows would be essentially the same as analyzed in the Draft EIS. The power plant would generate an estimated 31.4 million kilowatt hours (KWH) on an average annual basis. It would be constructed and operated by the Utah Division of Water Resources or a private electric utility company, or constructed by the Utah Division of Water Resources but operated by a private utility company.

The Rural Electrification Administration (REA) is participating with the BLM as a cooperating agency and would approve loan guarantee commitments by electrical utility companies for constructing hydroelectric facilities at the White River Dam and 0.5 mile of 138-kilovolt (kV) transmission line between the dam and other existing substations. REA would also be involved in the approval of a contract between private utility companies and the Utah Division of Water Resources to purchase electricity produced by the project. A contract between private utility companies and the Utah Division of Water Resources to operate the hydroelectric facility at the dam would also require REA approval.

### Location and General Description

The proposed dam would be located in eastern Utah about 40 miles (64 km) southeast of Vernal, Utah, in Section 17, Township 10 South, Range 24 East (Figure 2-1). The dam would be a 136-foot-high (41 m) zoned earth and rockfill structure as shown by the typical dam cross section in Figure 2-3. An outlet works, service spillway, auxiliary spillway, and a hydroelectric power plant would be constructed at the dam site, at the approximate locations shown on the general layout plan in Figure 2-4. Figure 2-5 is a visual simulation of the proposed dam and reservoir.

### Embankment and Foundation

The dam embankment would consist of an inner core constructed of impervious materials, an outer shell from sand and gravel, and a rockfill (Figure 2-3). Some select materials for internal drains, filter material, and transition zones could also be required. A cutoff trench extending to bedrock would be required to prevent excessive seepage through the sand and gravel deposits that presently overlay much of the dam site. This cut-off trench would extend the full length of the dam. Sand-cement grout would be used to seal cracks in the bedrock if they were found to exist. Riprap (large boulders, 1 to 3 feet in diameter, 0.3 to 0.9 m) would be placed on the upstream slope to prevent damage from wave action.

### Reservoir

The proposed White River Dam Project would cre-



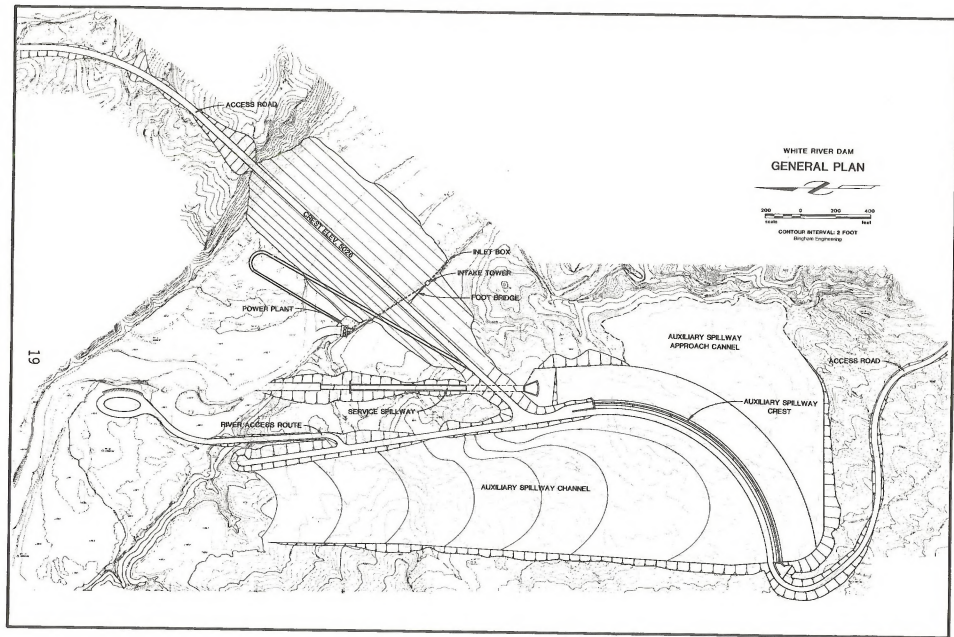


Figure 2-4  
GENERAL LAYOUT PLAN FOR THE WHITE RIVER DAM  
Source: Bingham Engineering 1981



Figure 2-5  
VISUAL SIMULATION OF PROPOSED WHITE RIVER DAM AND RESERVOIR

## DESCRIPTION OF ALTERNATIVES

ate a reservoir with a total storage capacity of 109,250 acre-feet (70,700 active and 38,550 inactive). At maximum capacity elevation, 5,017 feet (1,528 m), the reservoir would produce a body of water approximately 11.7 miles (19 km) long (13.5 river miles) with a maximum width of 0.7 miles (1.13 km) (Figure 2-6). About 1,980 surface acres (801 ha) would be inundated when the reservoir was filled to capacity. At the minimum water surface elevation of 4,970 feet (1,514 m), the reservoir surface would inundate approximately 1,128 acres (456 ha) and would extend 6.5 miles (10.5 km) upstream from the dam. Maximum depth of the reservoir from streambed to service spillway crest would be 127 feet (39 m). The area-capacity curves for the reservoir are shown in Figure 2-7.

As discussed in Chapter 1, Purpose and Need section, the applicant has projected that the project would deplete up to 75,000 acre-feet (104 cfs) plus approximately 5,500 acre-feet of evaporation. The 75,000 acre-foot figure is slightly higher than the active storage of 70,700 acre-feet. This would not present a problem because the present inflow to the reservoir (1931-1980 record at Watson) is 479,500 acre-feet.

Also with the present flows and the proposed run-of-the-river operation, the surface level would remain high, averaging 5.5 feet of drawdown during normal years. Under these conditions, a large percent of the flows entering the reservoir would be released. Only in periods of extreme drought would the reservoir be drawn down to or near the inactive storage level.

Vegetation in the fluctuation zone (47 feet) (14 m) of the reservoir would be removed and burned or buried, as would dead falls below the dead storage level.

### Outlet Works

The outlet works would consist of a 10-foot diameter (3 m) penstock (water supply pipe to the power generating turbines), a 36-inch diameter (91.4 cm) bypass pipe, and an intake structure. The penstock and bypass pipe would be encased in reinforced concrete, as shown in Figure 2-8, and would be supported on undisturbed bedrock. The intake for the outlet pipes would consist of a tower and three gated openings located at various levels and an ungated inlet box located at the base of the dam. These outlets are designed to release water at various temperatures. The gates would provide for emergency closure to enable inspection and maintenance of the pipes. The bypass outlet would be used to maintain downstream releases if the power plant were to be shut down.

### Spillways

#### SERVICE SPILLWAY

The service spillway would be a reinforced concrete structure on the left (south) abutment (Figure 2-4) with

an uncontrolled overflow crest elevation of 5,017 feet (1,528 m) and a capacity of 9,300 cfs. This capacity would be sufficient to pass a 100-year flood. The service spillway would discharge into a stilling basin energy dissipator near stream level below the dam. During May and June there would be up to 1,500 cfs of flow in the spillway 4 out of 10 years and no flow in the remaining months.

#### AUXILIARY SPILLWAY

An auxiliary spillway located south of the dam abutment would be designed to accommodate flows to 86,000 cfs. The crest of the auxiliary spillway would be at an elevation of 5,019 feet (1,529 m) and would have a length of 1,500 feet (457 m). A road would be located across the crest of the spillway as shown in Figure 2-4. The existing natural draw (into which flood flows from the auxiliary spillway would discharge) would be enlarged and graded. This spillway would be used in an extreme flood emergency to provide for the structural safety of the dam.

#### Material Sources

Approximately 2,600,000 cubic yards (1,987,960 m<sup>3</sup>) of material would be needed to construct the various zones of the dam embankment. Most of the material would be obtained from the excavation for the auxiliary spillway, shown in Figure 2-4.

The rock excavated for the access road, outlet works, and power house would also be incorporated into the embankment as rockfill and riprap. It is anticipated that as much as 925,000 cubic yards (707,255 m<sup>3</sup>) of rockfill would be excavated.

In addition to the above on-site borrow material areas, two off-site borrow areas have been identified as potential sources for material for the embankment and inner core. The areas are shown in Figure 2-9. Site 1, located east of Utah State Highway 45, north of Bonanza, has a surface area of approximately 450 acres (182 ha). Site 2, on the west side of Utah State Highway 45, adjacent to Site 1, has a surface area of approximately 432 acres (175 ha). A total of approximately 120,000 cubic yards (91,752 m<sup>3</sup>) of material could be required from these sites for construction of the dam.

Two sources are being considered for sand and gravel required for concrete aggregate: terrace deposits upstream from the dam and a commercial source near Jensen, Utah. In either case, the material would have to be processed to satisfy concrete aggregate requirements.

#### Construction

Dam construction would require about 2 years and 15 to 50 workers on schedule. Figure 2-10 shows the

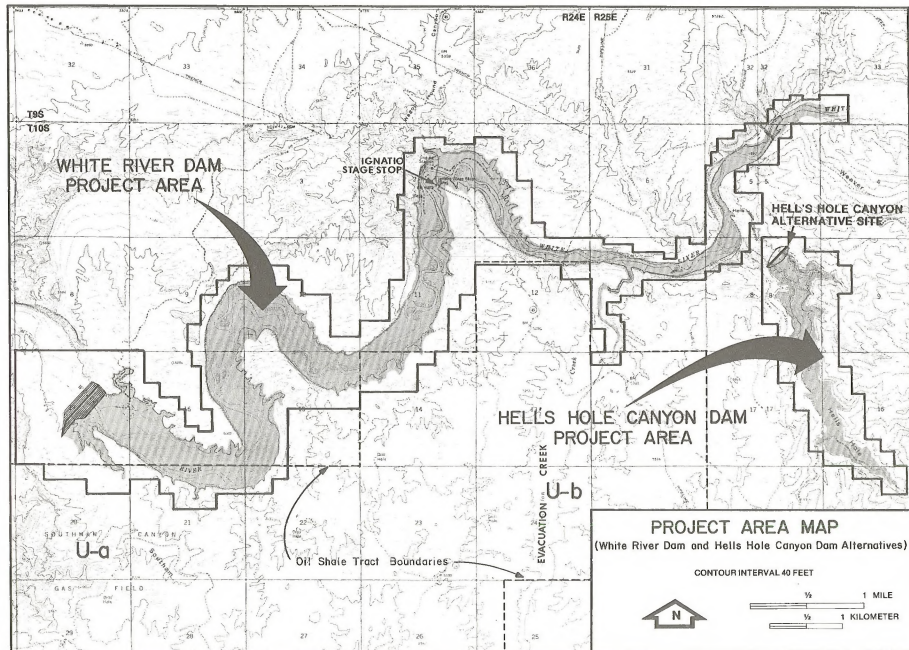


Figure 2-6

PROJECT AREA FOR WHITE RIVER RESERVOIR AND HELL'S HOLE CANYON RESERVOIR

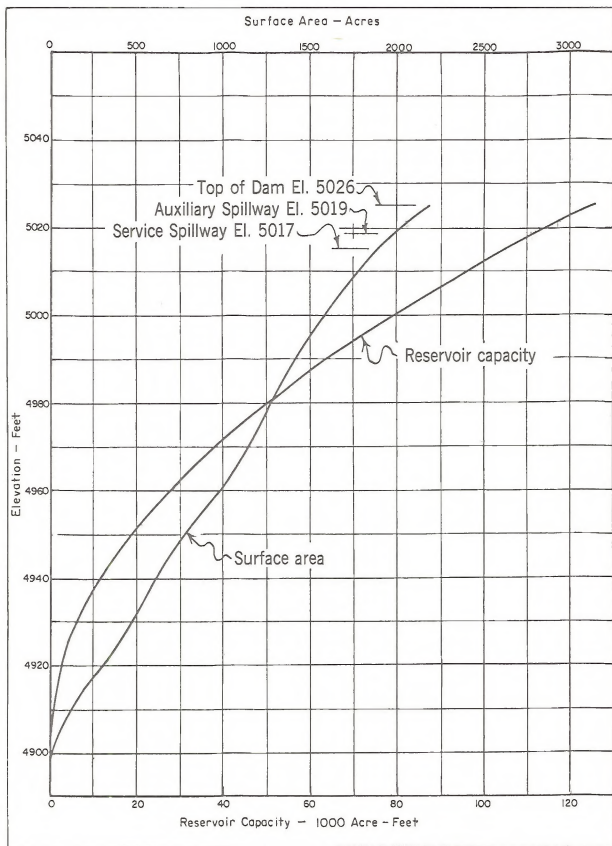
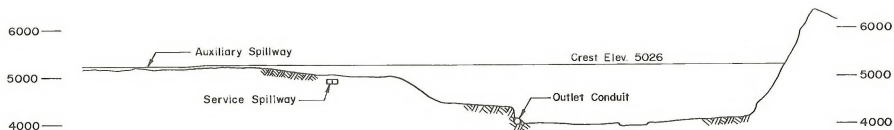


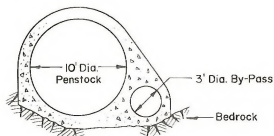
Figure 2-7  
**AREA CAPACITY CURVES FOR THE WHITE RIVER RESERVOIR**  
 Source: Utah Division of Water Resources (1981)



### PROFILE ALONG AXIS OF DAM

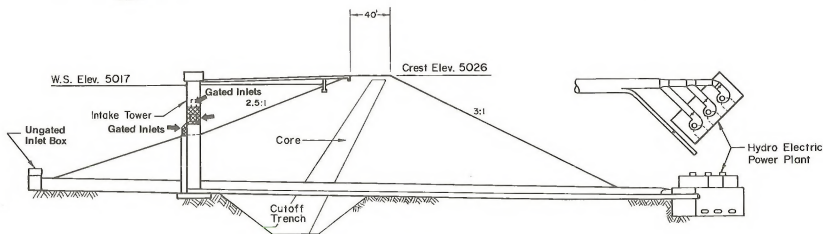
200 100 0 200 400 600

HORIZONTAL SCALE IN FEET  
VERTICAL SCALE = 2 X HORIZONTAL



### OUTLET CONDUIT

N.T.S.



### SECTION THRU OUTLET

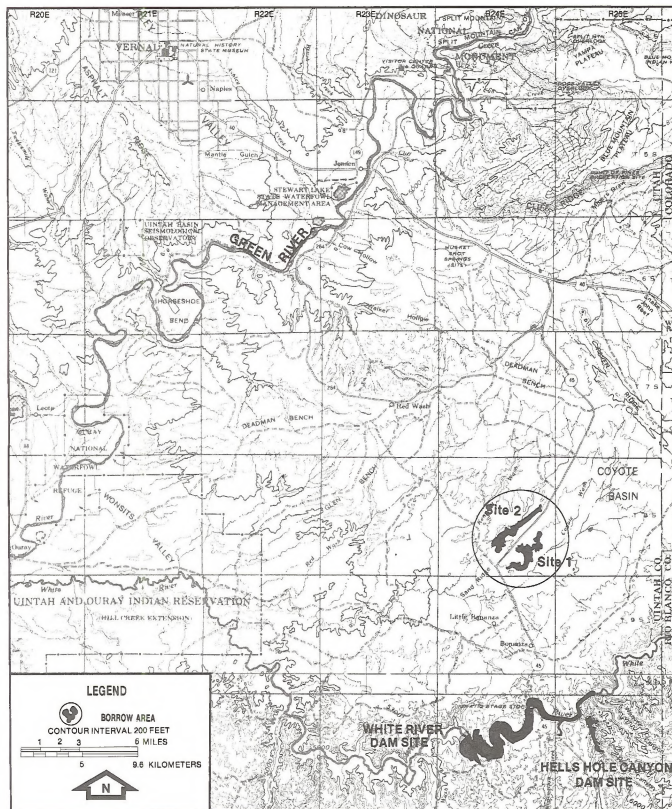
50 0 50 100

SCALE IN FEET

Figure 2-8

PROFILE ALONG AXIS, AND SECTION THROUGH OUTLET WORKS, OF THE WHITE RIVER DAM

Source: Utah Division of Water Resources (1981)



**Figure 2-9**  
**BORROW AREAS AWAY FROM THE DAM CONSTRUCTION ZONE**

# WHITE RIVER DAM CONSTRUCTION SCHEDULE

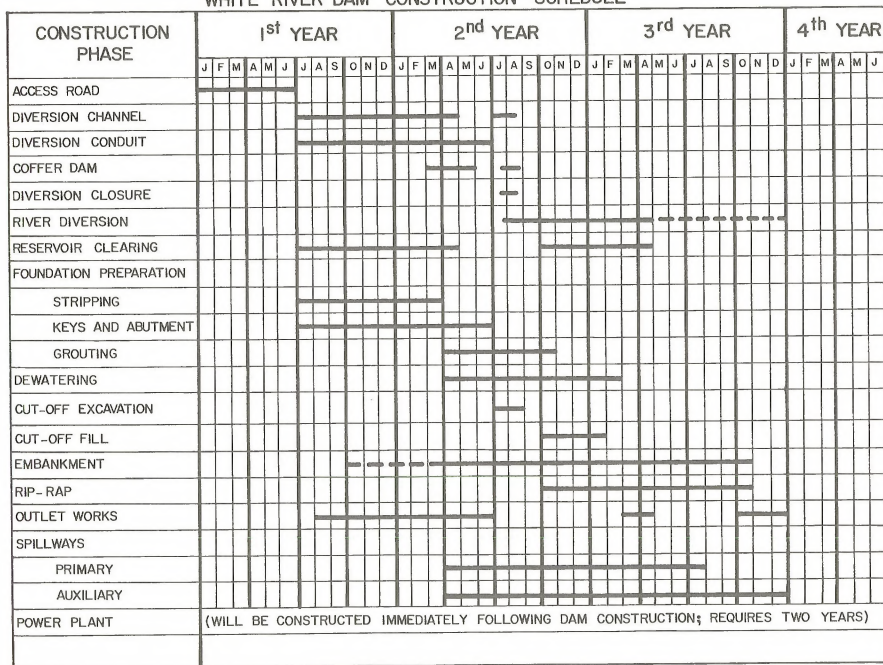


Figure 2-10  
WHITE RIVER DAM CONSTRUCTION SCHEDULE

Source: Utah Division of Water Resources (1979)

## DESCRIPTION OF ALTERNATIVES

projected construction. Excavations and embankment operations would require about 20 workers. About 50 workers would be required during a 6-month period for concrete forming and placing (Bingham Engineering 1982). It is expected that some construction workers would come from local communities, including the Ute Indian Reservation, and these workers would commute to the site.

The outlet works would probably be one of the first features of the dam to be constructed. A cofferdam (temporary barrier) across the river upstream from the proposed dam would be constructed to divert the river through an unlined canal to the outlet works during construction of the cutoff trench.

Excavation of the cutoff trench would require an extensive dewatering system to keep the bottom of the trench dry. The water pumped from the dewatering system would be discharged into the river. If the water carried significant amounts of sediment, it would be routed through sediment ponds before discharging to the river.

A concrete batch plant would probably be constructed near the site to supply concrete for the construction of the spillway, outlet works, and power house. The specific location of the batch plant would be determined by the contractor, but would be situated within the project area.

### Reservoir Operation

The White River produces an average annual discharge of approximately 503,000 acre-feet (the average recorded flow for the period 1924 to 1978 as measured at the USGS Stream Gage Station, located near Watson about 7 miles [11 km] upstream of the proposed dam site). The reservoir, with initial filling, would store 109,250 acre-feet. Therefore, no problem is expected in filling the reservoir and maintaining a substantial outflow through the dam. Current operating plans developed by the Utah Division of Water Resources call for maintaining a consistent outflow release of 250 to 2,000 cfs (see Appendices 3 and 4) which would be sufficient for power production requirements as well as minimum downstream flow requirements. However, the potential does exist for flows lower than 250 cfs for short periods of time. For example, when flows in the White River at the head of the reservoir are lower than the flows identified by the FWS as being necessary for the Colorado squawfish, the natural flow of the river would be released, plus any stored water necessary to meet downstream requirements.

A computer simulation of anticipated reservoir operations has been completed by the Utah Division of Water Resources for the 48-year period from 1931 to 1980. The simulation provides information pertinent to the reservoir as to:

1. Whether the active capacity is sufficient to meet all potential demands of the river under project conditions;
2. The drawdown required;
3. The maximum and minimum releases for power generation within acceptable limits of the turbine;
4. Resulting spills.

Results of the simulation are available in a report prepared by the Utah Division of Water Resources (1980a).

Reservoir operating levels are expected to range between 5,006 and 5,017 feet (1,525 and 1,528 m) of elevation under normal conditions, potentially reaching extremes of 4,970 (1,514 m) to 5,019 feet (1,529 m) in worst-case situations. The 100-year flood is estimated at 9,000 cfs, which would be reduced approximately 2,500 cfs by the reservoir's flood routing effects. The 100-year flood could be readily handled by the service spillway. The auxiliary spillway, designed for larger floods, would have a capacity of 86,000 cfs.

The reservoir would have a total storage capacity of 109,250 acre-feet, of which 3,023 acre-feet would be dead storage (below the outlet) and 35,527 acre-feet would be reserved for sediment and fish conservation. The reservoir could be drawn down 47 feet (14 m) before reaching the inactive storage level, although this drop is not anticipated under foreseeable operating policy. The outlet works would be designed to withdraw water from between 4,921 and 4,994 feet (1,499 and 1,521 m) of elevation.

An interagency group consisting of BLM, USBR, Utah Division of Water Resources, and private consultants, analyzed the sediment accumulation of the reservoir. They assumed a 94-percent trap efficiency based upon studies of other similar reservoirs. Based on this assumption, Grenney and Kraszewski (1980) analyzed all available sediment and flow data and, using the technique of Hawkins (1980), determined that the average sedimentation in the reservoir would be approximately 1,273 acre-feet per year. If no main-stream dams are constructed in Colorado on the White River, this amount would fill the available sediment storage space (the inactive storage of 38,550 acre-feet) in approximately 33 years. The entire reservoir would fill with sediment in approximately 86 years, based on the current reservoir size of 109,250 acre-feet. There are no plans for eventual dredging or construction of a sluice to remove sediment from the proposed reservoir.

### Hydroelectric Power Plant

A 15-MW capacity hydroelectric power plant would be constructed near the downstream toe of the dam at the approximate location shown in Figure 2-4. The

## DESCRIPTION OF ALTERNATIVES

plant would generate an estimated 31.4 million kilowatt hours (KWH) on an average annual basis.

The power plant would be built by the Utah Division of Water Resources or by an electrical utility under agreement with the Utah Division of Water Resources. It would be built immediately following construction of the dam and would require 20 to 50 workers for a period of 2 years (Bingham Engineering 1982).

The power plant would be designed to produce power from releases of 250 cfs minimum to 2,000 cfs maximum under a maximum head of 129 feet (39 m) and a minimum head of 82 feet (25 m).

### Power Transmission System

A 138-kilovolt (kV) power transmission line would extend from the hydroelectric plant to the Bonanza Power Plant site which is being constructed in several sections of Townships 8 and 9 South, Range 22 East, at the approximate location shown in Figure 2-1. The route would be about 10.5 miles (17 km) long and 60 feet (18 m) wide and require approximately 77 acres (31 ha) of right-of-way. The H-frame towers would consist of two wooden poles approximately 55 to 60 feet (17 to 18 m) high and spaced 13.5 feet (4 m) apart. A 28-foot (8.5 m) timber cross arm would span the two poles and support the power transmission lines about 50 feet (15 m) above the ground. The towers would be spaced generally 650 to 700 feet (198 to 213 m) apart. Figure 2-11 shows a similar transmission line in Uintah County, Utah.

An alternate power line route, shown in Figure 2-1, could be followed and would terminate at an existing Moon Lake Electric Association power line located within Section 1, Township 9 South, Range 24 East, north of Bonanza, Utah. It would be about 14 miles (22 km) long and 60 feet (18 m) wide and would use about 102 acres (41 ha).

A substation would be located near the dam site. It would require a 75-foot by 100-foot (23 m by 30 m) parcel of land. The exact location of the substation has not yet been determined, but would be located within the project area.

### Access Roads

U.S. Highway 40 and Utah State Highway 45 currently provide all-weather access from Vernal to Bonanza. Uintah County has filed a right-of-way application with BLM for upgrading and realigning approximately 5 miles (8 km) of existing Utah Highway 45. The county road project will extend south from Bonanza to the boundary of the White River Shale Project as shown in Figure 2-12.

The road will have a 34-foot-wide (10 m) paved surface and will be designed for traffic traveling up to 50 miles per hour (80 km). A new bridge is being

constructed across the White River near the existing bridge. The bridge will be approximately 600 feet (183 m) in length and 36 feet (11 m) wide, with earthen berms on each end of the bridge to maintain an elevation above the high water level of the proposed White River Dam. The location of the proposed bridge is shown in Figure 2-13. The upgrading and realignment of the existing road and the new bridge by Uintah County will maintain traffic across the White River.

Two existing roads are being considered by the applicant as haul routes to the dam site. The route selected would be upgraded and graveled to insure all weather access to the dam site.

Alternative A would utilize the existing unimproved road from the Bonanza-Ourray Highway to the White River near the dam site. A short section of rock excavation would be required at the approximate location circled in Figure 2-12. Alternative B would utilize the proposed county road down Wagon Hound Canyon to a point approximately 0.5 mile (0.8 km) from Ignatio. At that point Alternative B would use an existing road to the proposed White River Dam site. Both of the alternative routes would utilize the same road for about the last 4 miles (6.4 km). The exact alignments of the proposed alternatives have not been set. Generally, the roads would be located within 250 feet (76 m) of either side of the center lines of the existing roads. The only exceptions would be with Alternative A in the areas requiring rock excavation and the common alignment as it approaches the crest of the dam. Considerable rock excavation would be required to construct an approach for the access road to cross the dam as shown in Figure 2-4. The common route of both alternatives would continue across the dam and connect with an existing road to South Canyon. This would require about 1 mile (1.6 km) of new construction from the dam before the road connects with the existing South Canyon Road.

### Recreation

The recreation potential of the proposed White River Reservoir and tailwaters has been appraised by the Utah State Division of Parks and Recreation (1980). That agency suggests the significance of the recreational aspects of the dam would depend heavily on the quality of the fishery. Therefore, it recommends a three-phase development plan.

Phase I would include one boat ramp near Ignatio with a parking lot and toilets, and river access below the dam for fishing and river running (Figure 2-14). Phases II and III would include additional camping and parking spaces at Ignatio and a boat ramp and campground near the dam as visitation pressures increase (Figure 2-14). Phases II and III would be instituted as the need arose. Figure 2-15 is an aerial photograph of the Ignatio area.

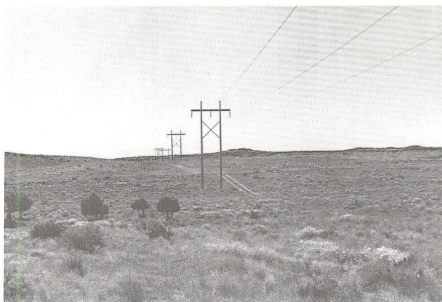


Figure 2-11

**PHOTOGRAPH OF AN H—FRAME TOWER TRANSMISSION LINE IN UINTAH COUNTY, UTAH**

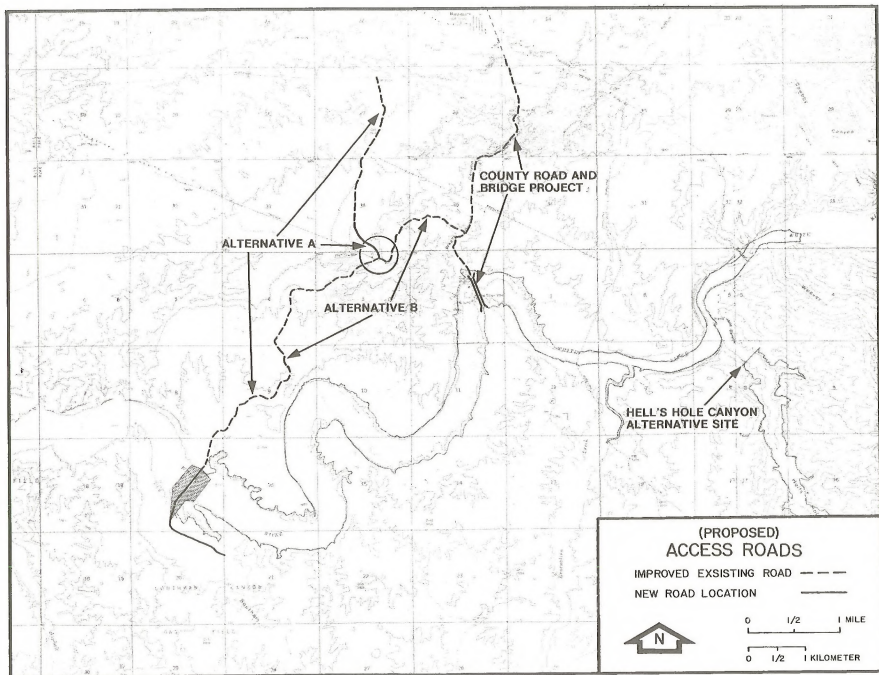
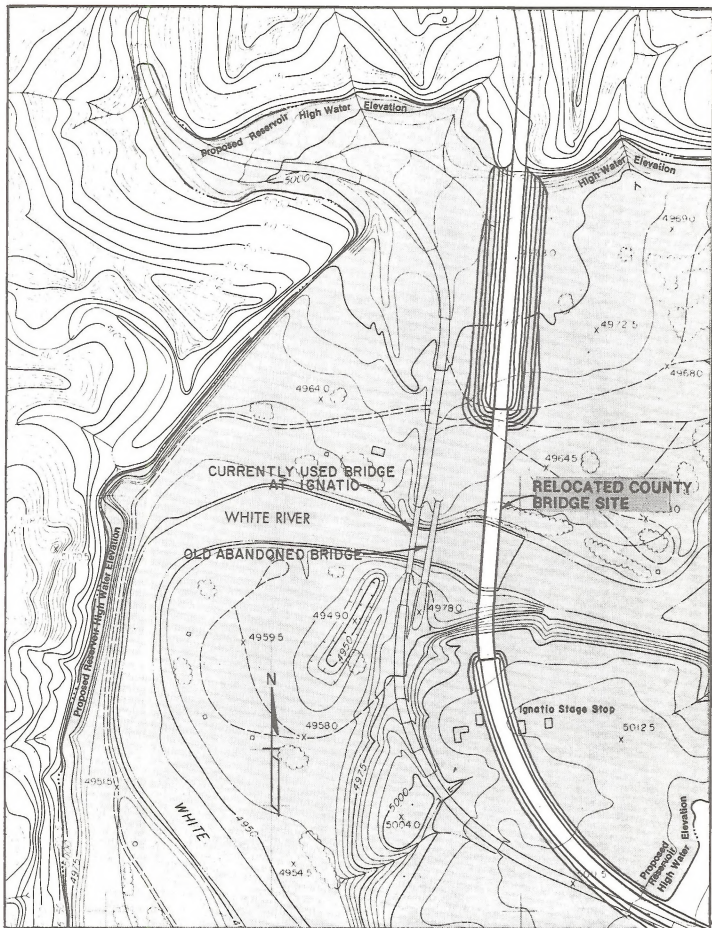


Figure 2-12

## ACCESS ROADS ASSOCIATED WITH THE WHITE RIVER DAM PROJECT

Source: Utah Department of Transportation



Figures 2-13  
**PROPOSED ABUTMENT AND BRIDGE ACROSS THE WHITE RIVER RESERVOIR AT IGNATIO**  
 Source: Horrocks Engineering 1981

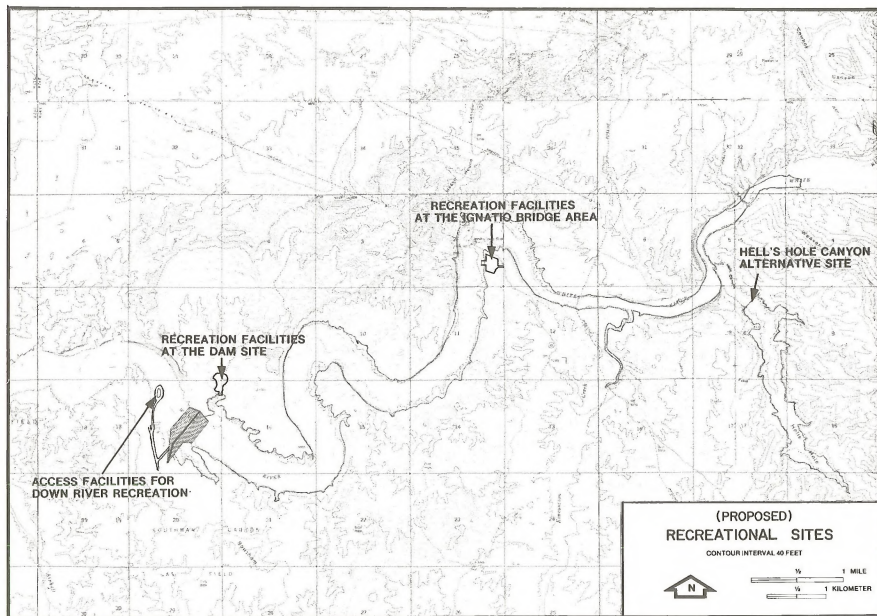


Figure 2-14

# PROPOSED RECREATIONAL SITES ASSOCIATED WITH THE WHITE RIVER DAM AND RESERVOIR

Source: Utah Division of Water Resources (1979)

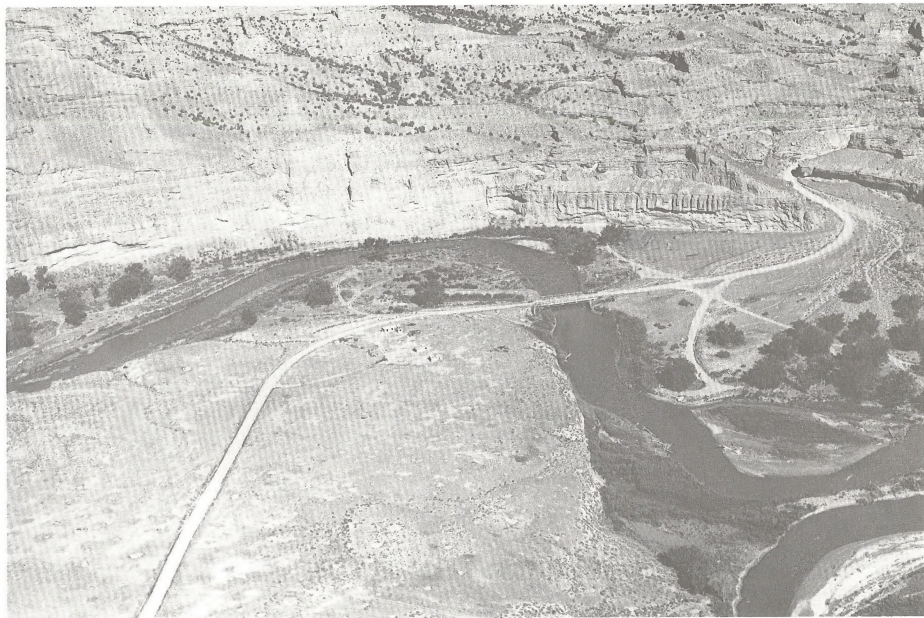


Figure 2-15  
AERIAL VIEW OF IGNATIO AREA

## DESCRIPTION OF ALTERNATIVES

### ALTERNATIVE 2: NO ACTION

This alternative would constitute BLM denial of the right-of-way applications for the Utah Division of Water Resources to use Federal lands for the proposed reservoir project. In addition, it means that Alternatives 3, 4, or 5 would not be selected. The No Action Alternative could remain in effect for a short time or a long, indefinite period.

Under the No Action Alternative, the current level of development and patterns of management would be maintained, especially as related to BLM-administered land in the affected area. No major permanent water diversion facilities would be built for oil shale development at this time.

The No Action Alternative would be intended to avoid major commitments of resources at this time so that conflicts between energy needs and environmental values could be further studied. It would be intended to accommodate further definition (or firming up) of actual energy-related water demands as oil shale technology develops, as well as additional definition of possible interrelated projects in the Upper Colorado River Basin. It would be intended to preserve present options available in resource management and decision-making.

Chapter 3 describes the existing environment of the White River area. The intent would be to maintain the present environmental status under the No Action Alternative.

The No Action Alternative is required in this EIS in accordance with regulations of the Council on Environmental Quality and the National Environmental Policy Act. It is a valid alternative to be considered in the decision-making process.

### ALTERNATIVE 3: PUMPING FROM THE WHITE RIVER AND AUGMENTING FROM HELL'S HOLE CANYON DAM

#### Location and General Description

The main water supply for this alternative would be direct pumping from the White River. Individual diversions and pumping stations along the White River required by the various developers are not discussed here but would require separate environmental analyses. As indicated in the Introduction of this chapter, flows less than 350 cfs occur approximately 20 percent of the time. In average water years, natural flows would have to be augmented to supply 97 cfs to users and 250 cfs for downstream requirements (see Appendix 3).

When natural flows in the White River, Utah are less than quantities needed (350 cfs), then releases from

the Hell's Hole Canyon Reservoir into the White River would be made. This would assure water supplies needed for energy development projects (i.e., White River Shale Project, Tosco Development, and others). Future increased depletions from the White River in Colorado would increase the frequency of need for water from Hell's Hole Canyon Reservoir.

The Hell's Hole Canyon Dam would consist of an earth-filled dam constructed across Hell's Hole Canyon within Section 8, Township 10 South, Range 25 East (Figure 2-5). The dam site is located about 4 miles (6.4 km) southeast of Bonanza, Utah, in Uintah County. Figure 2-16 is a visual simulation of the proposed Hell's Hole Canyon Dam and Reservoir. The purpose of the dam would be to provide a 25,000 acre-foot reservoir to augment the water supply in the White River. As previously mentioned, this would be a partial alternative because during drought conditions such as in 1977 more than 25,000 acre-feet of storage would be required.

The USBR conducted a reconnaissance level study on the feasibility of constructing a dam in Hell's Hole Canyon (USDI, Bureau of Reclamation, 1974). No borings were made to determine subsurface conditions and only a reconnaissance level geologic study was conducted.

Hell's Hole Canyon Dam would be constructed near the canyon's intersection with the White River (Figure 2-6). A 300-cfs capacity outlet works and a 1,000-cfs spillway would be constructed as appurtenant structures to the dam. The location and details of these structures have not been established.

The reservoir would be filled by pumping water from the White River and conveying it through a 0.5-mile-long (0.8 km) welded steel pipeline having a diameter of 54 inches (137 cm). This would require a 138-cfs pumping plant, a diversion structure and intake channel, and an off-stream settling pond and sluiceway for return of sediment to the river. The diversion structure would not extend across the White River.

#### Embankment and Foundation

The Hell's Hole Canyon Dam would be a zoned earth structure approximately 294 feet (90 m) high. An upstream slope of 3:1 and a downstream slope of 2:1 were used in the analysis. The embankment volume would be approximately 4,450,000 cubic yards (3,402,470 m<sup>3</sup>). A cutoff trench extending to bedrock would extend the full length of the dam. Since subsurface information at this site is not available the required depth of the trench is not known, but it would probably not exceed 25 to 30 feet (7.6 to 9 m). Riprap would be used on the upstream slope to prevent damage from wave action.



Figure 2-16

VISUAL SIMULATION OF HELL'S HOLE DAM AND RESERVOIR SHOWING DIVERSION WORKS AND PUMPING FACILITIES

## DESCRIPTION OF ALTERNATIVES

### Reservoir

The reservoir would inundate about 260 acres (105 ha) at a normal water surface elevation of approximately 5,340 feet (1,627 m), as shown in Figure 2-6. The maximum water surface elevation would be 5,358 feet (1,632 m). The reservoir would have a total capacity of 25,000 acre-feet. No dead or inactive storage would be provided. It is unlikely that the reservoir would provide important recreational facilities or suitable fisheries habitat.

Water would be pumped into the reservoir during periods of high flow. The reservoir would then act as a regulatory system with intermittent releases to the White River for energy development projects.

Since the water would be pumped into the reservoir from a settling pond, little silt accumulation is anticipated.

### Flood Design

Although it was found that the normal flows from the Hell's Hole Canyon would make a negligible contribution to the water supply, a 1,000-cfs capacity spillway would be necessary to provide for flood volumes of up to 5,500 acre-feet.

### Water Diversion and Pumping Facilities

A diversion structure and intake channel and a pumping station would be provided on the river. Since the sediment content of the river is high at the diversion point, a settling pond and sluiceway for return of sediment to the river would also be provided. The details of these facilities were not established in the reconnaissance level study conducted for this alternative. For purposes of this EIS, however, it was assumed that these facilities would border the river for 0.33 mile (0.5 km).

A buried pipeline would start at the pumping station and extend up the floor of Hell's Hole Canyon approximately 0.5 mile (.8 km) to the base of the dam. It would be encased in concrete and pass under the dam into the reservoir. The section under the dam would probably use the outlet works pipe.

### Material Sources

Approximately 4,450,000 cubic yards (3,402,470 m<sup>3</sup>) of fill material would be required to construct the various zones of the embankment. The specific source of the fill material was not determined during the Hell's Hole Canyon reconnaissance study. Some of the material could come from the access road excavation. If sufficient borrow material were not available in the reservoir area it would be necessary to import material from other locations. The other borrow

areas would probably be further up Hell's Hole Canyon (south of the reservoir).

A supply of concrete aggregate for construction of the spillway, outlet works, diversion structure, settlement pond, sluiceway, and pumping station would be required. This aggregate would probably be imported from a commercial gravel pit (such as the one near Jensen, Utah).

### Construction Activities

The construction of Hell's Hole Canyon Dam would require about 2 years and from 20 to 60 workers (Utah Division of Water Resources 1979). Twenty to forty workers would probably be required during the major portion of the construction phase of the project. Construction workers would probably be local and commute to the site.

Since the Hell's Hole Canyon Dam would be at an off-stream site, water diversion during construction would be a simple process. The depth to the groundwater table is not known but it is unlikely that dewatering would be required during construction of the cutoff trench.

### Access Roads and Power Line

All-weather access would be required to the dam site. Although specific access road alignments have not been decided, Utah State Highway 45 through Ignacio Stage Stop would provide the most likely access to the dam. From Utah 45, the existing unimproved road starting in Section 20 and extending north through Sections 17 and 8 would be improved. About 3 miles (5 km) of road construction would be required in the vicinity of the dam to provide access to the pump station and diversion structure at the base of the dam.

New construction and considerable excavation would be required to build the road down to the dam. The road would then be routed down the face of the dam to reach the pipeline and pumping station areas.

Power to run the pumps would be brought in from an existing line at Ignacio. The power line (69 kV) would follow Highway 45 and the access road to the dam site.

## ALTERNATIVE 4: PUMPING WATER FROM THE GREEN RIVER

### General Description

Alternative 4 would provide 70,000 acre-feet of water at a constant rate of 97 cfs to the vicinity of the proposed White River Dam site. Water would be released from Flaming Gorge Reservoir into the Green River. The water would then flow downstream approximately 120 miles (193 km) to a point near the mouth of Walker Hollow (Section 14, Township 6 South, Range

## DESCRIPTION OF ALTERNATIVES

22 East), about 5 miles (8 km) south of Jensen, Utah, where it would be pumped to the vicinity of the proposed White River Dam for distribution to water users (Figure 2-17).

Flaming Gorge Reservoir, constructed as a feature of the Colorado River Storage Project, is located on the Green River in northeastern Utah and southwestern Wyoming. It is approximately 70 miles (113 km) north of the White River and Oil Shale Tracts Ua and Ub. Water would be provided from Flaming Gorge Reservoir in a continuous flow to provide the required 97 cfs.

Project elements required to provide water to the vicinity of the proposed White River Dam would include a river pumping station, a settling pond and sluiceway, two high-lift pumping stations, and approximately 28 miles (45 km) of buried welded steel pipeline.

### Pumping Facilities and Pipelines

The river pumping stations would be located on the south bank of the Green River (Section 14, Township 6 South, Range 22 East). The pumps would lift water from the river and transport it about 1,000 feet (305 m) to a settling pond, as shown in Figure 2-18. Sediment would be returned to the river through a sluiceway. A second pumping station would lift the water about 500 feet (152 m) from the settling pond to a small regulating reservoir about 4.5 miles (7.2 km) from the river as shown in Figure 2-18. The third pumping station would transport the water the remaining 24.5 miles (39.4 km) to the vicinity of the proposed White River Dam as shown in Figure 2-17. A pipeline approximately 54 inches (137.2 cm) in diameter would be used to transport the water. The pipeline right-of-way would be 110 feet (33 m) wide and much of the alignment would be along an existing power line corridor. Bedding material for the pipe would be obtained from local commercial sources such as the gravel pit at Jensen, Utah.

Each pumping station site would require up to 15 acres (6 ha) for the pumping station structures and regulating reservoirs. An all-weather access road and power supply would be required for each pumping station. The power line would follow the pipeline route.

### Water Right

The USBR has a water right for approximately 500,000 acre-feet of water in storage in Flaming Gorge Reservoir with a priority date of August 7, 1958 (Water Right Application No. 30414). USBR has indicated a willingness to release water down the Green River where it could be picked up and pumped to the Oil Shale Lease Tracts Ua and Ub and used for oil shale processing. Discussions held with USBR personnel indicate this water could be purchased and delivered to the Green River pump station for \$10 per acre-foot. The USBR suggested the material con-

tained in their 1974 publication "Alternative Sources of Water for Oil Shale" can be construed as their commitment to supply water from Flaming Gorge Reservoir (Bingham Engineering 1976).

However, it is the opinion of the Utah Division of Water Rights (State Engineer), that the filings by the USBR and the depletion allowances connected with the Central Utah Project do not leave any water which can be contracted for outside of that which is already allocated to the individual units of the Central Utah Project, and water that would be withdrawn from the Green River to supply the Indian lands on the Leland Bench Project (Utah Division of Water Rights 1981).

### Construction

Construction activities would include construction of the pump stations and pipeline. Approximately 50 percent of the trench excavation would be rock excavation. Manpower requirements for construction would be 20 to 50 workers for 2 years (Bingham Engineering 1982).

## ALTERNATIVE 5: PUMPING WATER FROM THE WHITE RIVER AND SUPPLEMENTING WITH WATER PUMPED FROM THE GREEN RIVER

### General Description

With Alternative 5, the main water supply (97 cfs) would normally be pumped from the White River. Individual diversions and pumping stations along the White River required by the various developers will not be discussed here but would require separate environmental analyses. When the natural flow of the White River fell below 350 cfs, water would be pumped from the Green River via pipeline to supplement the White River water (Figure 2-17). The water would be released from Flaming Gorge Dam as in Alternative 4. As discussed earlier, supplementary water would be required approximately 20 percent of the time during normal water years. In drought years such as 1977, 39,000 acre-feet would have been needed from the Green River. A theoretical worst-case situation would require 70,000 acre-feet from the Green River. For EIS analysis purposes, the capacities of the pipeline and pumping system were considered to be 70,000 acre-feet per year, the same as Alternative 4 (see Appendix 3). However, since water would be pumped from the Green River at infrequent intervals, it would be more economical to use a smaller pipeline and greater pumping energy for this alternative than for Alternative 4. The pipeline alignment would be the same for this alternative as for Alternative 4, and the right-of-way would also be 110 feet (33 m) wide.

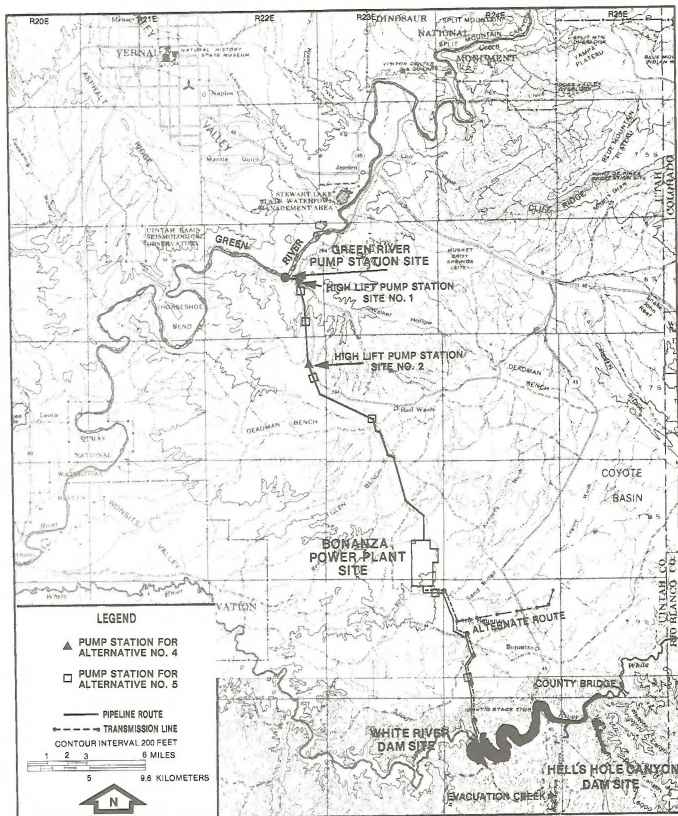


Figure 2-17  
FACILITIES ASSOCIATED WITH ALTERNATIVES 4 AND 5, PUMPING FROM THE GREEN RIVER

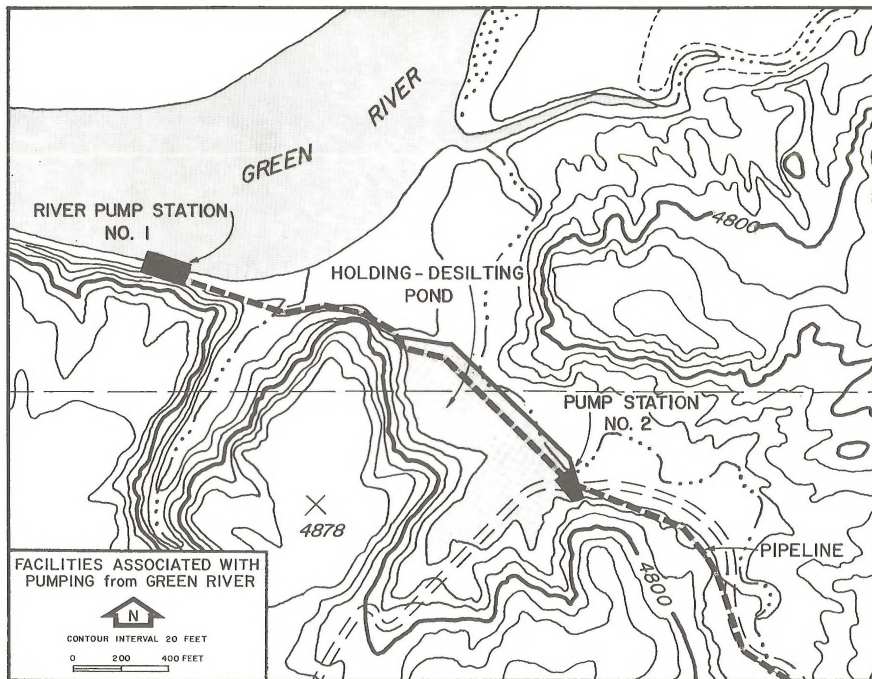


Figure 2-18

RIVER PUMP STATION AND SEDIMENT PONDS ASSOCIATED WITH ALTERNATIVES 4 AND 5, PUMPING FROM THE GREEN RIVER

## DESCRIPTION OF ALTERNATIVES

Project elements required to provide water to the vicinity of the proposed White River Dam would include a Green River pumping station, a settling pond and sluiceway, six high-lift pump stations, and approximately 29 miles (47 km) of buried welded steel pipeline.

### Pumping Facilities and Pipelines

The river pumping station and settling pond would be located at the same locations as in Alternative 4 (Figure 2-18). Although a settling pond was used in developing this alternative, it might not be necessary to have the settling pond if the water were pumped directly to the White River pumping station for distribution. Six high-lift pumping stations at the approximate locations shown in Figure 2-17 would be used to pump the water from the Green River to a point near the location of the proposed White River Dam. A power line system would follow the pipeline route to provide power to the pump stations.

A buried welded steel pipeline approximately 36 inches (91.4 cm) in diameter would be used to transport the water. Bedding material for the pipeline would be obtained from commercial sources such as the Jensen pit.

### Construction

Construction activities would include construction of the pump station and pipeline. During construction of the pipeline, approximately 50 percent of the trench excavation would probably be rock excavation. Manpower requirements for the project would be approximately 20 to 50 workers for 2 years.

## COMPARATIVE ANALYSIS

Table 2-1 (located at the back of this chapter) provides a comparative analysis of the alternatives and summarizes the unavoidable adverse impacts, irreversible and irretrievable commitments of resources, and the effect of short-term use of the environment on its long-term productivity which would result if the White River Dam Project were implemented.

Unavoidable adverse impacts listed in the table are negative environmental impacts that remain despite mitigation efforts. Adverse impacts which are of low significance or of very short duration are not included. The table also indicates whether the adverse impact is irreversible or irretrievable. Actions committing future generations to continue a similar course are considered irreversible. Irretrievable is defined as not recoverable nor retrievable; once used, not replaceable.

The relationship between short-term uses of the environment to maintenance and enhancement of long-term productivity is briefly discussed for each alternative. Short term is generally used as the proj-

ect's life. The life of Alternative 1, the White River Dam, is difficult to assess due to the unpredictability of potential sediment filling. It is estimated at 52 years if the time period the project can deliver 75,000 acre-feet of water is used. It is estimated at 86 years if the time period for the reservoir to fill completely with sediment is used. Potential future depletions of the White River in Colorado could extend the life of the White River Dam by reducing sediment loads. Long term is the period beyond the project's predicted life.

Construction of the White River Dam Project (Alternative 1) and the Hell's Hole Canyon Dam Project (Alternative 3) would use approximately  $7.72 \times 10^{11}$  and  $7.64 \times 10^{11}$  British thermal units (Btu), respectively. Pumping from the Green River (Alternative 4) would be the most energy intensive, requiring  $4.1 \times 10^{12}$  Btu for construction and  $4.68 \times 10^{11}$  Btu annually due to the electrical requirement of pumping (BIO/WEST 1980). Supplementing the White River by pumping occasionally from the Green River (Alternative 5) also would have a fairly high energy requirement. During operation, the White River Dam Project would be the only one of the alternatives which would be a direct producer of energy, with the hydroelectric power plant output of up to 31,400,000 KWH ( $1.1 \times 10^{11}$  Btu) per year (see Appendix 5).

Based on withdrawals of 70,000-75,000 acre-feet per year, all of the alternatives would result in a loss of 68,580,000 KWH per year at downstream mainstem Colorado River hydropower projects (USDI, Bureau of Reclamation 1981).

Table 2-2 is a summary of the approximate costs of construction and operation of the proposed alternatives for 50 years. (A detailed cost analysis is provided in Appendix 6.) Annual costs of construction were calculated using a 12-percent interest rate and electricity was assumed to cost \$0.015/KWH. Figures were based on 1979 dollars. These figures are a rough, order-of-magnitude cost to be used for general comparative purposes only.

To give these numbers perspective, a 100,000 barrels per day (bpd) oil production facility may require 20,000 acre-feet of water per year. The cost of water per barrel of oil for the lowest cost alternative, the White River Dam, would be \$0.023/barrel. The cost of water per barrel of oil for the highest cost alternative, pumping from the Green River, would be \$0.084/barrel. Considering the cost of a barrel of oil to be in the \$30 to \$40 range, water costs for any of the alternatives would be a small portion of the total cost.

## AGENCY-PREFERRED ALTERNATIVE

The selection of the agency-preferred alternative is based on the information contained in this EIS as well

TABLE 2-2  
A Comparison of Rough Cost Estimates  
for Each of the Alternatives

	Alternatives			
	White River Dam	Hell's Hole Canyon Dam to Augment White River	Pumping From Green River	Pumping From Green to Augment White River
<u>Construction Cost</u>				
Total (\$)	20,000,000	23,400,000	51,200,000	41,000,000
Annual (\$/yr)	2,400,000	2,820,000	6,170,000	4,940,000
Annual Power Cost (\$/yr)	-- <sup>a</sup>	60,000	2,060,000	520,000
Total Annual Cost (\$/yr)	2,400,000	2,880,000	8,230,000	5,460,000
Quantity of Water Supplied (ac-ft)	75,000	70,000 <sup>c</sup>	70,000	70,000
Cost of Water (\$/ac-ft/yr)	32	41	118	78

Source: Anderson 1980.

<sup>a</sup>Pumping costs were not included in the cost analyses of any of the alternatives.

<sup>b</sup>Annual power income of approximately \$1,150,000 (based on \$0.04 per KWH) is not included in the comparison as it may not be applied to the water cost. Rather, it may be returned to the State Water Fund directly as a separate item.

<sup>c</sup>The 45,000 acre-feet of White River water, together with the 25,000 acre-feet of storage from Hell's Hole Canyon Dam would have a total depletion of 70,000 acre-feet.

## DESCRIPTION OF ALTERNATIVES

as agency policy, applicant need, engineering and reliability information, and the comments received to date from other agencies and the public.

Based on the above factors, BLM has selected Alternative 1, White River Dam Project, including the hydroelectric power plant, as the agency-preferred alternative. This alternative could be constructed and operated with minimum impacts, provided that real and committed mitigation of identified impacts was accomplished. The proposed project would be subject to mitigating measures presented in Chapters 2 and 4 and the conservation measures discussed in the US Fish and Wildlife Service (FWS) Biological Opinion (included as Appendix 4 in this EIS).

The main issue involved in the agency-preferred alternative is the impact on the Colorado River squawfish and the White River Penstemon (*Penstemon albidulvis*). The FWS has determined in its Biological Opinion that impacts to the endangered fish and sensitive plant can be mitigated by certain dam operation and conservation measures; therefore, it is their view that this project would not jeopardize the continued existence of either species.

Should other data or factors become evident during the 30-day review period of this Final EIS that would show cause for BLM not to authorize the use of public land for the White River Dam Project, the agency-preferred alternative may be revised or further defined.

## MITIGATION

This section summarizes applicant-proposed and standard Federal agency measures which would minimize or eliminate adverse impacts to the human environment. These measures would be employed because of existing laws, court decisions, agency policy, or firm applicant commitment.

### Applicant-Proposed Mitigation

## REVEGETATION

It is anticipated that most of the borrow materials would be removed from areas excavated for project features (auxiliary spillway, access roads, etc.). The borrow material areas outside the project area would be shaped to drain and blend in with the surrounding topography. They would also be seeded with natural cover to prevent erosion. The topsoil from the borrow material areas would be stockpiled and replaced. The auxiliary spillway would also be shaped and blended into the surrounding topography and, except in bedrock areas, planted for erosion control.

## FISHERY FACILITIES

Intake velocities through the trashracks for the outlet works and for any future pumping facilities would normally be maintained at less than 2 feet (0.6 m) per second.

## TEMPERATURE CONTROL OUTLET WORKS

The outlet works would consist of an inlet tower with three gated openings located at various levels, and an ungated inlet box located at the base of the dam. These four inlets would allow water to be released at various temperatures as specified by FWS Biological Opinion.

## FUGITIVE DUST CONTROL

The borrow material areas and embankment would be kept moist to achieve desired compaction and would alleviate dust formation. Haul roads would be sprinkled periodically to keep dust to an acceptable level as defined by the appropriate Federal official.

## OIL-TAR SEEP

The exploratory oil drill hole (Section 17, Township 10 South, Range 24 East) in the reservoir area located near the dam site (Figure 2-19) would be inundated. The drill hole would be sealed by excavating the alluvium down to the bedrock surface to locate the original drill hole. The drill hole would then be reamed to a 6- to 8-inch diameter to a depth of 40 feet and then grouted with cement (Bingham Engineering 1981b).

## Standard Mitigation Required of the Applicant By Federal Agencies

Authority for Federal requirements for this project is granted under the following:

National Environmental Policy Act of 1969

Eagle Protection Act of 1969

Fish and Wildlife Coordination Act of 1958

Preservation of American Antiquities Act of 1906

Wilderness Act of 1964

National Historic Preservation Act of 1966, as amended

Executive Order 11593 of 1971 (Protection and Enhancement of the Cultural Environment)

Federal Land Policy and Management Act of 1976

The Clean Air Act, as amended 1977

The Federal Clean Water Act of 1977

Endangered Species Act, as amended 1978



Figure 2-19  
OIL-TAR SEEP NEAR DAM SITE

## DESCRIPTION OF ALTERNATIVES

Executive Order 12088—Federal Compliance with Pollution Control Standards

Executive Order 11990—Protection of Wetlands and Riparian Areas

Executive Order 11988—Floodplains Management

National Wildlife Refuge Systems Administration Act of 1966

Federal Aviation Act of 1958

Occupational Safety and Health Act of 1970

Federal Noxious Weed Act, 1974

Executive Order 11989 - ORV Use on Public Lands

National Electric Safety Code

The measures listed below are general guidelines for mitigation and may be altered by the appropriate Federal official to meet site specific needs. The Utah Division of Water Resources would, when restoring or rehabilitating areas disturbed by the construction of the dam, transmission lines, pipelines, and associated access roads across private lands, use the same reclamation measures as required by land managers of adjacent Federal lands or reclamation measures as requested or required by the private landowner (Utah Division of Water Resources 1981).

### TRANSPORTATION

A transportation plan would be submitted by the applicant for review and approval by the appropriate land management agency. This plan would cover approval of temporary, reconstructed, and newly constructed roads and would include clearing work, rehabilitation, and use associated with transportation needs. Overland (off-road) access could be specified in lieu of road construction or reconstruction.

Travel would be restricted to the right-of-way or established roads and trails. Scalping of vegetation on disturbed areas would be minimized.

All access roads blocked by construction of project components would be rerouted or rebuilt and cattle-guards or gates would be provided along the new access roads as directed by the appropriate Federal official.

Increased speed and volumes of traffic along the road would increase the chance of livestock being struck by vehicles. Haul roads would require appropriate warning signs to alert drivers to the hazards.

All new and improved access roads would be properly designed to channel water during heavy storms.

Heavy equipment would be kept within designated cleared areas within the rights-of-way to avoid unnecessary damage to vegetation.

Natural drainage features (rivers, streams, washes,

etc.) would be crossed at existing roads or bridges, except at locations designated by the appropriate Federal official. The applicant would be required to install culverts or bridges at points where new permanent access roads would cross streams and/or washes. Where drainages would be crossed by temporary roads, dirt fills or culverts would be placed and removed upon completion of the project. All stream channels and washes would be returned to as near natural state as possible.

The applicant would be required to control noxious weeds as directed by the appropriate Federal official.

### FIRE

A fire control plan would be prepared in cooperation with the BLM. Internal combustion engines would be equipped with approved exhaust mufflers or spark arrestors.

### LITTER CONTROL

All trash, packing material, waste petroleum products, and other refuse would be removed from construction areas and salvaged or placed in approved sanitary landfills.

### SAFETY

The applicant would comply with grounding and clearance requirements of the National Electric Safety Code and appropriate Rural Electrification Administration (REA) bulletins.

Transmission lines would be marked by attaching colored balls in high hazard areas.

Electrical and other hazards along transmission lines would be eliminated by following established clearing codes.

### EXISTING IMPROVEMENTS

All existing improvements (e.g., fences, pipelines, etc.) along project-related linear facilities (pipelines, transmission lines, etc.) would be protected and damaged due to construction would be repaired.

### SURVEY MARKERS

All public land survey monuments and private property corners would be located, marked, and protected. In the event of destruction, they would be recorded and replaced to the extent practical (except under structures or in the impoundment area).

### EXISTING RIGHTS-OF-WAY, OIL AND GAS LEASES, AND MINERAL RIGHTS

Issuance of rights-of-way for project facilities would be subject to valid existing prior rights. This would

## DESCRIPTION OF ALTERNATIVES

safeguard the rights of persons or companies whose mineral rights, oil and gas leases, oil shale leases, or other such claims preceed those of the Utah Division of Water Resources. BLM would make any land use grant for a new project subject to existing valid leases and claims. The White River Shale Project (developer for Oil Shale Tracts Ua and Ub lease holders) has indicated that, for the portion of leases which would be inundated by the reservoir, they would not object to the reservoir encroachment so long as the project were built as proposed. They have indicated that the proposed White River Dam Project would not seriously affect future oil shale mining operations. In a letter to the Utah Division of Water Resources dated September 15, 1981, the White River Shale Project stated:

"... that the White River Dam and its resultant reservoir will not have a significant adverse impact on the safety, ore recovery, or operation of the White River Shale Project mining plans for Tracts Ua and Ub. We feel we are aware of these impacts, have evaluated them, and we have plenty of time to incorporate new data as it becomes available from actual mining operations."

### OTHER REQUIRED STANDARD MEASURES

Blasting and other surface disturbances would be prohibited within 500 feet of all live springs, reservoirs, or water wells.

Blasting and all other surface disturbances would be prohibited within 500 feet of all dwellings, recreation trails, roads, highways, and recreation site improvements and developments, unless otherwise approved by the appropriate Federal official.

Areas subject to mudflows, landslides, mudslides, rock falls, and other types of mass movement would be avoided in locating the linear facilities. Where such avoidance was not practical, the design, based upon detailed field investigations and analysis, would provide measures to prevent the occurrence of mass movements.

Care would be taken to prevent spills of petroleum products and reduce erosion by rip-rapping critical areas.

Other mitigation measures which have been developed as a result of the impact analyses are presented in Chapter 4 for each resource.

### Mitigation Required of the Applicant By State and Local Entities

The same or additional mitigating measures could be required by State and local officials. Authority for this is granted in the State of Utah under the Utah Code Annotated (UCA) 1953, 63-2-1.

TABLE 2-1  
Comparative Summary of Unavoidable Adverse Impacts

Environmental Elements (Resource)	Alternative 1 White River Dam	Alternative 2 No Action	Alternative 3 Pump From White River - Supplement With Hell's Hole Canyon Dam Water	Alternative 4 Pump Water From Green River	Alternative 5 Pump Water From White River - Supplement With Water From Green River	Commitment of Resource		Relationship of Short-Term Use of Environment to Long-Term Productivity
						Irreversible	Retrievable	
Minerals	Up to 47.6 million barrels of shale oil and an unquantifiable amount of other minerals would not be extracted during the life of the project on the 1,980 acres (801 ha) inundated by the reservoir.	None.	Oil shale recovery would not occur on about 760 acres (105 ha) for the life of the project.	None.	None.	No	Project life	After the reservoir basin filled in with sediment, the resources could be recovered, hence, no loss would occur in the long term.
Paleontology	Some fossils potentially important to science could be lost on 3,144 acres (1,272 ha).	None.	An unquantifiable number of important fossils could be lost on 339.5 acres (137 ha).	An unquantifiable number of fossils important to science could be lost on the 425 acres (172 ha) disturbed.	An unquantifiable number of fossils important to science could be lost on the 485 acres (196 ha) disturbed.	Yes	Yes	Once lost, the fossils could not be replaced or recovered.
Soils	An unquantifiable amount of soil would be lost on 1,137 acres (460 ha) due to erosion and removal of construction material at the dam site.	None.	A small amount of soil would be lost by erosion from disturbed areas.	An unquantifiable amount of soil would be lost by erosion on the 425 acres (172 ha) disturbed.	Same as Alternative 4 on 485 acres (196 ha).	No	Yes	The duration of the loss would extend through several decades, depending on the severity of the disturbance. Total removal of existing soils would cause loss of productivity for several decades as soil rebuilds very slowly in this area.
Water Resources	There would be a 80,500 acre-foot yearly depletion in Flows of the White and Green Rivers.	None.	There would be depletions of 70,000 acre-foot plus evaporation from the White and Green Rivers.	The Green River would be depleted by 70,000 acre-feet of water per year.	Same as Alternative 3.	No	Yes	The water depleted would not be available in the short term, but natural flows would be resumed when the reservoir ceased operations.
	A 4.1 mg/l increase in salinity at Imperial Dam would occur. The Salinity increase would create an annual loss of \$450,000 per mg/l.	None.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	No	Project life	Water quality would be restored when the depletion was no longer needed.
	The channel of the White River below the dam would be armored as fine sediments were scoured out of the bed.	None.	None.	None.	None.	Yes	Yes	The channel would remain armored long after the reservoir was filled in with silt and sand.
	Water in the reservoir would be thermally stratified, and the deeper cold water zones would be oxygen deficient. Increases in hydrogen sulfide and phosphorus content occurring for a short period in the fall could affect water quality in the reservoir.	None.	None.	None.	None.	Project life	Project life	This could increase water quality degradation in the long term.

(continued)

TABLE 2-1 (continued)

Environmental Elements (Resource)	Alternative 1 White River Dam	Alternative 2 No Action	Alternative 3 Pump From White River - Supplement With Hell's Hole Canyon Dam Water	Alternative 4 Pump Water From Green River	Alternative 5 Pump Water From White River - Supplement With Water From Green River	Commitment of Resource		Relationship of Short-Term Use of Environment to Long-Term Productivity
						Irreversible	Irrecoverable	
Floodplains	About 995 acres (403 ha) of riparian floodplain would be inundated. Another 4,575 acres (1,851 ha) below the dam would be affected by decreased flows and armoring, causing a decrease in total riparian acreage.	None.	None.	None.	None.	No	Project Life	The floodplain would reestablish a reservoir filled with sediment or was no longer needed.
Vegetation								
General	About 995 acres (403 ha) of riparian and 547 acres (221 ha) of upland vegetation would be inundated by the reservoir. Additional acreages of upland vegetation would be occupied by access roads, a transmission line, and recreation sites, depending on which alternative would be constructed. An additional unquantifiable amount of upland vegetation would be temporarily disturbed. An unquantifiable amount of downstream riparian floodplain vegetation would be lost or modified on 4,575 acres (1,851 ha).	None.	Loss of 0.5 acre (0.2 ha) of riparian and 339 acres (137 ha) of upland vegetation would occur.	Up to 15 acres (6 ha) of riparian vegetation and up to 30 acres (12 ha) of upland vegetation would be occupied by three pump stations and an access road. Disturbed acres could require up to 15 years for native vegetation to become re-established.	Same as Alternative 4 except loss of an additional 45 acres (18 ha) of upland vegetation.	No	Project Life	It is likely the disturbed areas would be restored to their native condition, but productivity would be restored when the reservoir is no longer needed. Disturbed areas could require up to 15 years for native vegetation to become re-established.
Threatened, Endangered, and Sensitive Species	One population of <i>Penstemon albidiflorus</i> , a sensitive species, would be inundated.	None.	None.	A small but unquantifiable number of Uinta Basin hookless cactus, a threatened species, could be destroyed, but the loss would not jeopardize their continued existence.	Same as Alternative 4.	Yes	Yes	It is not likely that the continued existence of any plant species would be jeopardized. The USFWS opinion is that, with an implemented memorandum of understanding, the continued survival of the White River <i>Penstemon</i> would be insured.
Terrestrial Wildlife								
Mammals	The loss of about 995 acres (403 ha) of riparian habitat would result in the loss of up to: 176 beaver; 189 cottontails; and 200 deer. Unquantified additional loss to these species would occur in the riparian area along the White River below the dam. Additional unquantified deer losses would occur in surrounding areas which presently rely on the White River riparian area for fawn production.	None.	None.	None.	None.	No	Yes	Habitat lost for all mammals would not be restored to the present condition, but could be partially restored when the reservoir was no longer needed. Additional habitat would be provided for deer through mitigation.

(continued)

TABLE 2-1 (continued)

Environmental Elements (Resource)	Alternative 1 White River Dam	Alternative 2 No Action	Alternative 3 Pump From White River - Supplement With Hell's Hole Canyon Dam Water	Alternative 4 Pump Water From Green River	Alternative 5 Pump Water From White River - Supplement With Water From Green River	Commitment of Resource		Relationship of Short-Term Use of Environment to Long-Term Productivity
						Irreversible	Irretrievable	
4.8 Threatened, Endangered, and Sensitive Species.	Birds	Loss of about 995 acres (403 ha) of riparian habitat would displace 90 of 125 species of raptor and other nongame birds. Reduction of raptor population would occur due to loss of prey species (especially during drought conditions) and loss of nesting habitat.	None.	None.	None.	No	Yes	Habitat lost for birds would not be restored to the present condition but could be partly restored when the reservoir was no longer needed. The reservoir could attract additional species that are not presently inhabiting the area.
		An annual production of 36 Canada geese would be lost from the reservoir basin, and an additional production of 42 geese would be lost from the White River below the dam.	None.	None.	None.	No	Project Life	After the reservoir basin filled in with sediment, the nesting habitat would be restored both in the reservoir basin and below the dam or by the proposed mitigation plan. The proposed mitigation would eventually offset any loss to waterfowl.
	Aquatic Wildlife	None.	None.	None.	None.	--	--	--
	White River	None.	None.	None.	None.	--	--	--
Threatened and Endangered Species	General	The native aquatic ecosystem would be lost in the 13.5 river miles (22 km) of the reservoir and altered in the 50 miles (80 km) below the dam. However, for the 50 miles below the dam, the river would maintain a partial native ecosystem.	The loss of flow from this project could alter the native ecosystem in the White River.	None.	Same as Alternative 3.	No	Yes	The loss of the native ecosystem could not be replaced until the reservoir filled in and formed a river again. At that time, habitat would be too altered to support an ecosystem as it is at present.
	Green River	None with conservation measures as described in FWS Biological Opinion.	The loss of flows in the White River from the project could adversely affect the White River as squaw-fish habitat.	The loss of flows in the Green River from the project could adversely affect the endangered fish species.	Same as Alternative 3 and 4.	Yes	Yes	Once these species are extinct, they are lost forever. Should Alternatives 3, 4, or 5 be selected, Section 7 consultation with FWS would be reinitiated.
	General	The proposed White River Dam would adversely affect the aquatic ecosystem of the Green River by reducing flows.	The Hell's Hole Canyon Project could adversely affect the ecosystem of the Green River by reducing the flow by 97 cfs. This could cause changes in fish fauna.	Alternative 4 could adversely impact the aquatic ecosystem of the Green River depleting flows.	Same as Alternative 3 and 4.	No	Yes	Once the present aquatic ecosystem were lost, it would never be replaced.

(continued)

TABLE 2-1 (continued)

Environmental Elements (Resource)	Alternative 1 White River Dam	Alternative 2 No Action	Alternative 3 Pump From White River - Supplement With Hell's Hole Canyon Dam Water	Alternative 4 Pump Water From Green River	Alternative 5 Pump Water From White River - Supplement With Water From Green River	Commitment of Resource		Relationship of Short-term Use of Environment to Long-term Productivity
						Irreversible	Irretrievable	
Threatened, Endangered and Species	None (see official USFWS Biological Opinion).	None.	The loss of flow in the White River could adversely affect the White River as square fish habitat.	Flow reductions could adversely affect the bonytail chub, Colorado squawfish, humpback chub, and razorback sucker below the Walker Hollow point of diversion.	Same as Alternatives 3 and 4.	Yes	Yes	Once these species are extinct, they are lost forever.
Recreation	13.5 river miles (22 km) of canoeing stream would be lost. Also lost or degraded would be the associated opportunities for sightseeing and viewing of some wildlife, normally associated with float trips. Dispersed camping values along 13.5 river miles (22 km) of the White River Canyon would be lost.	None.	The loss of 97 cfs could reduce canoeing and rafting opportunities during low flow periods (August through September) and during drought years. This use would be eliminated.	None.	Same as Alternative 4.	No	Yes	The loss of canoeing stream cannot be replaced. Wildlife mitigation would offset the loss of deer and goose hunter days.
	Up to 936 hunter days per year for deer and 450 goose hunter days would be lost.	None.	None.	None.	None.	No	Project Life	The deer and geese populations would reestablish after the reservoir ceased operation and riparian areas became reestablished.
Visual Resources	There would be short and long-term degradation of existing scenic qualities. Current BLM VNM objectives would not be met.	None.	Land disturbance would remain for the period until revegetation became fully established and the general visual character of the project area would be reduced for this period.	Scenic quality would be degraded and VNM objectives would not be met along the Green and White River.	Same as Alternative 4.	No	Project Life	The losses of flowing water, the riparian zone, and wildlife (factors responsible for Class A scenic quality) would be replaced after the reservoir were no longer needed.
Land Use	A loss of forage for 23 cattle grazing 4.5 months on public land would occur. This reduction in livestock production would cause an economic loss to the rancher.	None.	Grazing for 11 sheep for 4 months each year on public lands would be lost.	Forage from 380 acres (154 ha) would be temporarily lost for up to 15 years. Three pump station sites of up to 15 acres (6 ha) each would be permanently lost to grazing.	Forage from 380 acres (154 ha) would be temporarily lost for up to 15 years. Up to 90 acres used for pump station sites, would be permanently lost to grazing.	No	Yes	Grazing would be lost until the reservoir revegetated.
	The current BLM Bonanza and Rainbow Management Framework Plans would not be met until proposed amendments to these plans are approved.	None.	The current BLM management framework plan objectives would not be met until amendments are made to present decisions.	None.	None.	No	No	The MFPs could be amended to allow for this project to be implemented.

(continued)

TABLE 2-1 (concluded)

Environmental Elements (Resource)	Alternative 1 White River Dam	Alternative 2 No Action	Alternative 3	Alternative 4	Alternative 5	Commitment of Resource		Relationship of Short-Term Use of Environment to Long-Term Productivity
			Pump From White River - Supplement With Hell's Hole Canyon Dam Water	Pump Water From Green River	Pump Water From White River - Supple- ment With Water From Green River	Irreversible	Irretrievable	
Cultural Resources	Some unquantifiable cultural resources could be destroyed or damaged during construction activities. Increased ease of access and use of the area could increase the potential for vandalism of archaeological sites.	None.	A small but unquantifiable number of cultural sites important to science and education could be lost.	An unquantifiable number of educational and scientific cultural sites could be lost.	Same as Alternative 4.	Yes	Yes	Once the sites were disturbed, their information could not be regained.

# CHAPTER 3

## THE AFFECTED ENVIRONMENT

### INTRODUCTION

This chapter describes only the affected environment, which is that portion of the existing environment that would be impacted by the proposed action or an alternative. The project area covers the portion of Utah shown in Figure 2-1. Rivers of concern are the White River in Utah and the Green River from Walker Hollow to its mouth. Environmental factors have been considered during the scoping process, the addressing of issues, and the preparation of this environmental impact statement (EIS).

For discussion (or identification) purposes in this EIS, the following definition is used:

**Project Area:** Specific land areas or corridors that would be utilized by the project alternatives or major components.

### TOPOGRAPHY

The region lies in northeastern Utah in the southeastern portion of the Uinta Basin. The topography is generally gently rolling hills at approximately 5,500 feet (1,675 m) elevation, with a rather sharp drop of about 600 feet (183 m) to the White River floodplain. The region is dissected by dry washes which form rather steep canyons near the White River.

### CLIMATE

The region has a semi-arid continental climate, characterized by meager precipitation (approximately 8 inches [20 cm] per year), extreme evaporation (36 inches per year [91 cm]), cold and dry winters, and hot and dry summers (US Department of Agriculture [USDA], Forest Service 1978, Hidore 1972). Precipitation is greatest in spring and early fall, primarily through thunderstorms. Average annual snow accumulation is about 10 inches (25 cm) (Utah Division of Water Resources 1979) but south-facing areas may remain free of snow for most of the winter. Mostly clear skies, intense daytime sunlight, and rapid nighttime cooling result in wide daily temperature ranges (National Oceanic and Atmospheric Administration [NOAA] 1974). The average July maximum temperature is 95F (35C) and the mean daily July temperature is 75F (24C), reflecting the sharp nocturnal cooling.

### AIR QUALITY

Air quality in the project area is good, reflecting the lack of significant sources of human contamination (VTN Colorado, Inc. 1977). Some local areas of poor air quality exist around such human activity as drilling rigs, roads, and the gilsonite plant at Bonanza.

### GEOLOGY

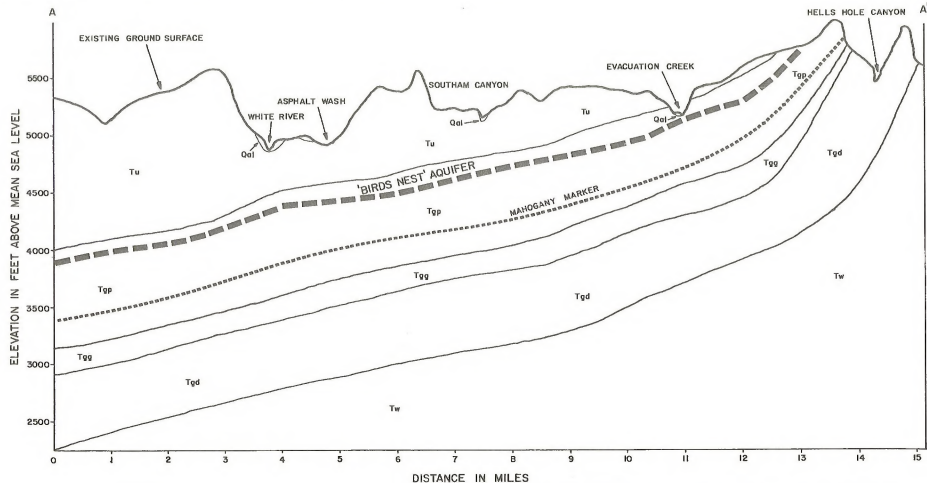
Three geologic formations of Eocene Age (60 million years ago) are exposed at the surface in the immediate project area. The lowest of those is the Green River Formation, consisting of approximately 1,600 feet (487 m) of light-to-dark gray, hard, dense marlstone and oil shale interbedded with lesser amounts of sandstone, siltstone, limestone, and volcanic tuff. This formation is exposed only in the eastern part of the area. The rich Mahogany zone oil shales are present about 500 feet (152 m) below the top of the formation (Figure 3-1).

The next higher formation is the Uinta Formation, consisting of approximately 1,000 feet (305 m) of stream-deposited sandstone and siltstone interbedded with minor amounts of shale and conglomerate.

The Duchesne River Formation overlies the Uinta Formation and is partially exposed on the northwestern part of the project area where it forms badland topography. Its constituents include reddish stream-deposited siltstone, sandstone, and conglomerate.

Rock structure within the area is relatively simple, with a few degrees northwestward tilt (dip) of the strata, flattening toward the northwest. Sets of northwest-trending and northeast-trending near-vertical joints are found throughout the entire reservoir area. The northwesterly trend is predominant. Some joints are offset a few feet and would be characterized as minor faults. High localized permeabilities have been measured; however, the joints tend to close with depth with a resulting decrease in permeability. The gilsonite deposits near Bonanza occupy some of the northwest-trending joints and faults. Release joints (fractures formed at pressure release joints) parallel the river valley in steep sandstone cliffs at the White River Dam site, and may be present elsewhere in cliff faces.

The project area is one of low earthquake hazard, as categorized on the Earthquake Hazards Map of the United States. The strongest documented earthquake near the project area occurred on October 11, 1960 approximately 145 miles southeast of the dam site and measured 5.5 on the Richter scale. Other seismic event epicenters of less magnitude occurred on February 15, 1967, 15 miles to the northeast of the dam site; and on April 21, 1970, 10 miles east of the dam site; both measured 4.6 on the Richter scale. However, no active faults have been found in the project area, and the nearest inactive mapped fault is 8 miles (13 km) southeast of the site (Bingham Engineering 1981a). Geologic features of linear routes are shown in the Environmental Profiles (Figures 3-11 to 3-14) at the back of this chapter.



### LEGEND

#### QUATERNARY

Qal ALLUVIUM

#### TERTIARY

Tu UINTAH FORMATION

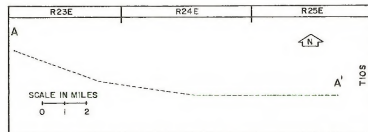
Tgp PARACHUTE CREEK MEMBER

Tgg GAROEN GULCH MEMBER

Tgd DOUGLAS CREEK MEMBER

Tw WASATCH FORMATION

— GREEN RIVER FORMATION



LOCATION OF CROSS-SECTION

## REGIONAL GEOLOGIC CROSS-SECTION

THROUGH WHITE RIVER DAM STUDY AREA

Figure 3-1  
GEOLOGIC FORMATION IN THE PROJECT AREA

Source: VTN, Inc. 1977

## MINERALS

### Oil and Gas

Several oil and gas fields exist in the project area. The Red Wash Oil Field would be crossed by Alternatives 4 and 5. One well is 1.5 mile (2.4 km) north of the proposed White River Dam site. Exploration and drilling activity is occurring within the project area. Figure 3-2 shows the location of leases affected by the project alternatives. Table 3-1 lists the project alternatives and the number of leases affected by each.

### Oil Shale

The project area for the White River Dam lies adjacent to Federal Oil Shale Lease Tracts Ua and Ub, being developed by the White River Shale Project. These are major Federal oil shale leases in Utah and encompass a total of 10,240 acres (4,144 ha). Other nearby leases include Tosco Development Corporation's 14,000-acre (5,666 ha) leases on State land along the White River about 30 miles (48 km) downstream from the proposed White River Dam. Paraho Corporation has State leases near Cowboy Canyon at the upper end of the proposed White River Reservoir. Magic Circle, Geokinetics, and Syntana-Utah leases on State land also occur in the region. High-grade oil shale underlies about 1,000 square miles (2,590 km<sup>2</sup>) of the eastern Uinta Basin and contains an estimated 80 billion barrels of oil (Cashion 1967).

All Federal lands in the project area have been withdrawn from mineral entry since 1920. The vast resources of oil shale prompted the withdrawal; however, this withdrawal was recently modified to allow land exchanges and sales which may expand the oil shale development. Over 200 pre-1920 unpatented oil shale mining claims occur in the project area. Only a small number of these would be affected by the alternatives as indicated in Figure 3-3, primarily at the upper end of the White River Reservoir and in Hell's Hole Canyon.

### Gilsonite

The Town of Bonanza is the nucleus of gilsonite mining in the United States. Gilsonite, also called Uintaite, is a solid hydrocarbon mineral which occurs in narrow vertical veins throughout the region surrounding the project area. These northwest-southeast veins measure up to 7 miles long (11 km) and 18 feet wide (5 m). The nearest exposure of a gilsonite vein to the reservoir is the Little Emma vein, located 0.3 mile (0.5 km) from the river at Ignatio. The Wagon Hound vein apparently terminates 0.6 mile (1 km) from the upper end of the reservoir near Hell's Hole Canyon.

### Tar Sand

Tar sand is found in the area, primarily in the Green River Formation below the oil shale layers. This sand is estimated to contain 7 billion barrels of bitumen (US Department of the Interior [USD], Bureau of Land Management [BLM] 1973). Western Tar Sand, Sohio, and Enercor-Mono Power Companies have tar sand leases on State land in the region. No tar sand development is planned in the reservoir basin (Bingham Engineering 1981a).

## PALEONTOLOGY

The Uinta Basin has a rather long and detailed history of paleontological discovery and analysis. Much of the paleontological literature of Utah pertains to this area. Therefore, the White River area has had considerable paleontological study (Bradley 1931, 1970, Brown 1934, Carpenter 1955, Cashion 1957, 1967, Chaney 1944, Cross and Wood 1975, Dase 1954, Davis 1916, Haj 1908, Knowlton 1923, MacGinitie 1969, Madsen and Nelson 1979, Miller 1975, Miller and Webb 1980, Peterson 1914, 1924, Riggs 1912, Robison 1978, Ryder and Fouch 1974, Scudder 1892, and Winchester 1918). The major fossil-bearing layers of the affected area are the Green River and Uinta Formations. Table 3-2 lists the known fossils from these two formations from the Uinta Basin.

The known fossil assemblage in the Uinta Basin has enabled paleontologists to construct a reasonably accurate history of this area, covering a several-million-year span including evolutionary changes, climatic regimes, and appearance and extinction of life forms. For example, the earliest record of camels and ducks comes from the Uinta Basin. The Cenozoic Era (the last 65 million years) has been divided into the shortest recognizable time intervals on the basis of fossil mammals. Two of these time intervals for North America, the Uintan and Duchesnean, are based on fossil mammals from the Uinta Basin.

The Duchesne River Formation lies below the surface alluvium. Fossils are rare and not commonly encountered in this formation. However, when encountered they are likely to be highly important because of their rarity (Hamblin 1981).

## SOILS

Soils within the project area are of the highly erodible desert type with moderate to low permeability. With the exception of soils in the floodplain of the White and Green Rivers and along drainages, the soils of the project area are shallow to very shallow (less than 20 inches [51 cm] deep) and are on sloping to steep upland terraces containing many areas of rock outcrops and rock escarpments. These light-colored, upland soils consist of loams and sandy loams. The soils found along intermittent stream channels in drainage-

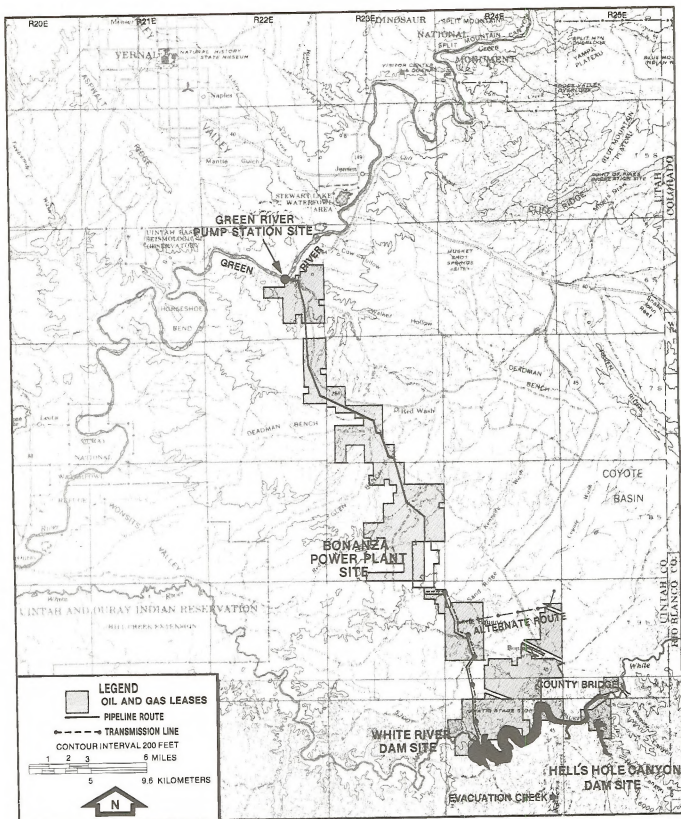


Figure 3-2  
OIL AND GAS LEASES IN THE PROJECT AREA  
Source: Bureau of Land Management 1980

TABLE 3-1  
Oil and Gas Leases Within the Project Area<sup>a</sup>

Alternatives	No. of Leases
White River Dam	
Dam and Reservoir	11
Access Roads	
Bonanza to Dam (Alt. A)	8
Wagon Hound Canyon to Dam (Alt. B)	7
Transmission Lines	
Dam to Bonanza Power Plant	8
Dam to Existing Power Line	14
Hell's Hole Canyon Dam and Access Roads	1
Green River Pipeline (Alt. 4 and 5)	40

<sup>a</sup>Maximum size of BLM leases is 2,560 surface acres.

TABLE 3-2  
Known Fossils From Two Formations in the  
White River Dam Project Area

Uinta Formation		Green River Formation	
<u>Plants</u>		<u>Plants</u>	
conifers		bacteria	algae
palm		fungi	conifer
sycamore		mold	angiosperms <sup>a</sup>
unidentified angiosperms		ferns	petrified wood
		moss	
<u>Invertebrates</u>		<u>Invertebrates</u>	
mollusks <sup>b</sup>		protozoans	ostracods
ichnites <sup>b</sup>		sponge spicules	spiders <sup>c</sup>
ostracods		snails <sup>d</sup>	insects <sup>c</sup>
		clams	ichnites <sup>b</sup>
<u>Vertebrates</u>		<u>Vertebrates</u>	
fish	uintathere <sup>e</sup>	fish	rodents
turtles	tillodonts <sup>e</sup>	turtles	bats
lizards	taeniodonts <sup>e</sup>	lizards	ichnites <sup>b</sup>
crocodiles	perissodactyls <sup>e</sup>	snakes	
birds	titanotheres <sup>e</sup>	crocodiles	
marsupials	rhinoceroses	birds	
primates	horse	marsupials	
insectivores	tapirs	primates	
creodonts	chalicotheres <sup>e</sup>	insectivores <sup>e</sup>	
carnivores	artiodactyls <sup>e</sup>	condylarths <sup>e</sup>	
condylarths <sup>e</sup>	dichobunids <sup>e</sup>	titanotheres <sup>e</sup>	

Source: Miller and Webb 1980.

<sup>a</sup>Flowering plants.

<sup>b</sup>Fossil tracks and burrows.

<sup>c</sup>Extremely abundant and varied.

<sup>d</sup>Including oysters.

<sup>e</sup>extinct group.

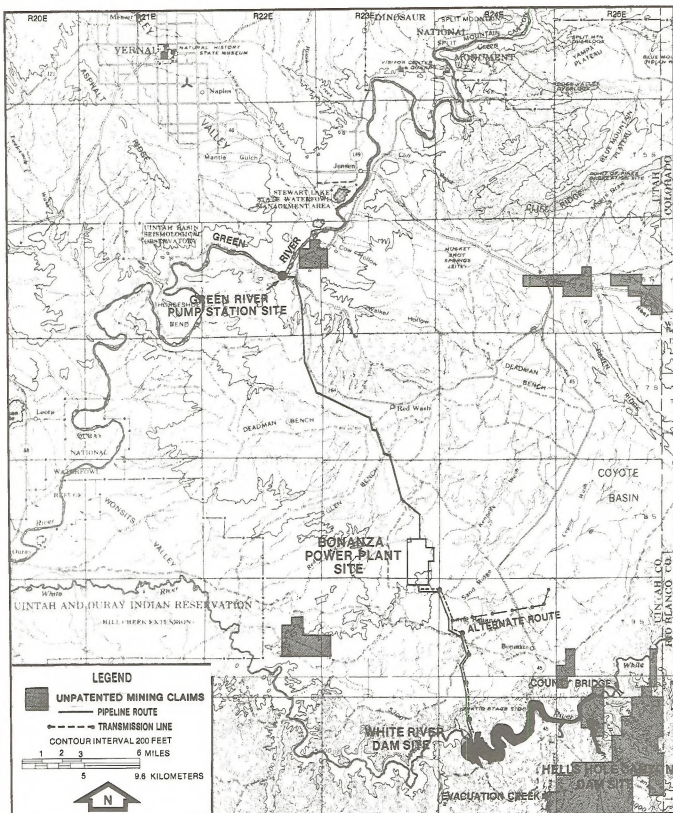


Figure 3-3  
**UNPATENTED MINING CLAIMS IN THE PROJECT AREA**  
 Source: Bureau of Land Management 1980

## AFFECTED ENVIRONMENT

ways such as Hell's Hole Canyon are generally deep (more than 59 inches [150 cm]), mainly sandy loams, light-colored, and moderately calcareous. Deep, moderately fine-textured, strongly alkaline soils occur mainly on stream terraces 50 to 100 feet (15 m to 30 m) above the White River floodplain. The soils occurring next to the White River are deep, silty, and generally have a high salt content.

The soils along the floodplain of the White River and along smaller drainageways in the area have formed from alluvium deposition. The alluvium along the White River is derived from a wide range of transported materials, whereas the materials in the smaller drainages are derived locally from the Uinta and Green River Formations. The parent material for the upland soils is also derived from the Uinta and Green River Formations.

Soil characteristics found along proposed linear features (power transmission systems, water pipelines, access roads) are shown in the Environmental Profiles, Figures 3-11 to 3-14, at the back of this chapter.

## WATER

The White River in Utah is currently used to only a limited extent. The American Gilsomite Company at Bonanza, Utah has a water right to 4.2 cubic feet per second (cfs) from the White River for municipal-industrial use, which it currently takes near Ignatio Bridge from wells along the river. The Ute Indian Tribe is currently irrigating 1,000 to 1,200 acres (405 to 486 ha) of land with water from the White River near the confluence of the White and Green Rivers (McKee and Morgan 1978). Extensive potential for increased water use in the future does exist, primarily through energy development.

## Surface Water

### HYDROLOGY

The White River is a tributary of the Green River, which forms part of the Upper Colorado River Basin. Its headwaters are located in western Colorado, where most of its flow derives from snowmelt. The river flows generally westward, reaching its confluence with the Green River at Ouray, Utah, approximately 26 miles (42 km) south of Vernal, Utah (Figure 2-1). The portion of the drainage area which encompasses the project area is arid, with only one perennial stream, Evacuation Creek.

The White River at the project area drains approximately 4,020 square miles (10,412 km<sup>2</sup>), and has maintained an average annual discharge of 502,800 acre-feet during the period 1923-1978. Figure 3-4 depicts historical monthly flow on the White River. The lowest annual flow of record was 223,000 acre-feet in 1977. Peak flows in late spring range from 3,000 to

4,000 cfs, while low flows in fall and winter range from 100 to 300 cfs. Table 3-3 provides observed monthly flow in cfs for the White River at the U.S. Geological Survey (USGS) Watson gaging station located south of Bonanza, Utah, and near Ignatio Bridge (Figure 2-6). Extreme flows recorded at the Watson station were 8,160 cfs in July 1929 and 10 cfs in July 1977.

There is presently no interstate compact between Colorado and Utah regulating the use of waters from the White River. Therefore, the possibility exists that White River flows in Utah could be reduced by an unknown amount by future upstream activities in Colorado. Also, the Ute Indian Tribe has a water right to irrigate lands along the lower White River below the proposed White River Dam (Winters Doctrine). At present there is uncertainty regarding the quantity of this right and whether both Utah and Colorado would be affected by it (see Summary, Unresolved Issues section).

The Final EIS for the White River Dam Project is not to be construed as reflecting the present or future position of any state of the Upper or Lower Colorado River Basin or of the Federal Government with regard to interpretation and application of the treaties, compacts, and laws which do or may affect the allocation of water among the states and among private claimants within each state. In particular, nothing in this EIS is intended to interpret the provisions of the Colorado River Compact (45 Stat. 1057), the Upper Colorado River Basin Compact (63 Stat. 31), the Water Treaty of 1944 with the United Mexican States (Treaty Series 994, 59 Stat. 1219), the decree entered by the Supreme Court of the United States in *Arizona v. California* (376 U.S. 340), the Boulder Canyon Project Adjustment Act (54 Stat. 774; 43 U.S.C. 620), or the Colorado River Basin Project Act (82 Stat. 885; 43 U.S.C. 1501), or to interpret or reach any conclusions regarding future application of the Federal reserved rights doctrine.

Furthermore, this EIS is not intended to represent the present or future position of either the State of Colorado or of the State of Utah or of the United States with regard to matters concerning the apportionment of the waters of the White River.

There are several tributary drainages entering the White River in the project area; however, only Evacuation Creek sustains flow throughout most of the year. The other drainages flow only during snowmelt and heavy rainfall. In general, the contribution of other surface sources to the White River in the project area is negligible.

The White River averages 2 to 4 feet (0.6 to 1.2 m) in depth and 150 to 200 feet (46 to 61 m) in width through the project area. Water velocities exhibit considerable seasonal variation in conjunction with fluctuation in volume of flow. The streambed habitat is composed

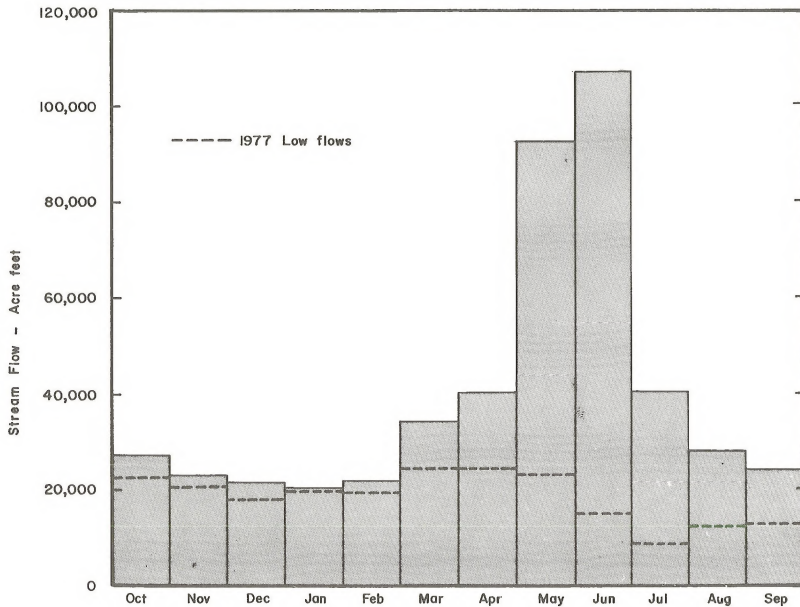


Figure 3-4  
MEAN HISTORICAL RUNOFF FOR THE WHITE RIVER NEAR WATSON, UTAH (BASED ON 1931-78 RECORDS) AND 1977 LOW RECORD FLOWS

Source: Utah Division of Water Resources (1979)

TABLE 3-3

Observed Flows (cfs) During Water Years 1963-1978<sup>a</sup>

Month	White River Near Watson			Green River at Green River, Utah		
	Max.	Min.	Mean	Max.	Min.	Mean
Oct.	546.4	242.3	421.1	4,919.6	772.5	3,237.9
Nov.	480.6	295.8	398.5	5,772.2	1,241.9	3,411.7
Dec.	432.6	252.1	350.1	4,748.9	1,179.1	3,349.5
Jan.	435.9	266.7	353.5	4,883.8	1,157.9	3,434.0
Feb.	462.7	306.1	376.3	5,632.2	2,047.2	3,679.8
Mar.	1,014.8	388.7	520.4	6,397.9	1,618.2	4,342.5
Apr.	880.6	408.4	550.7	11,047.8	2,591.4	5,598.0
May	2,091.4	383.8	1,421.8	19,174.3	5,649.8	11,931.3
June	2,934.2	263.8	1,765.2	21,057.1	4,409.7	14,445.9
July	1,523.9	139.9	637.4	14,614.1	824.5	6,176.6
Aug.	692.8	206.5	394.8	5,617.3	1,171.0	3,536.7
Sep.	546.2	211.7	381.0	4,139.1	1,594.8	3,000.9
Annual	781.3	308.6	630.5	7,429.0	2,300.8	5,512.1

Source: USDI, Geological Survey 1981.

<sup>a</sup>Water Years 1963-1978 utilized to coincide with the closure of Flaming Gorge Dam in 1962.

## AFFECTED ENVIRONMENT

primarily of runs, with some scattered riffles of rather insignificant frequency. Sand and silt predominate the substrate composition, with limited occurrence of varying-sized cobbles in higher velocity riffle areas.

The Green River from Walker Hollow near Jensen, Utah, to its confluence with the Colorado River is also included in this study. Average annual flows at Jensen, Utah, and Green River, Utah, are 3,157,000 acre-feet/year and 4,568,000 acre-feet/year, respectively, which equates to 4,360 and 6,309 cfs. The river is primarily sustained by upper elevation snowmelt from watersheds lying north of the White River and has been partially regulated by Flaming Gorge Reservoir since 1962. Extreme flows recorded at Jensen were 36,500 cfs in 1957 and 102 cfs in 1904, and at Green River were 68,100 cfs in 1917 and 255 cfs in 1931.

Table 3-3 provides observed monthly flow in cfs for the Green River at Green River, Utah. Peak flows normally occur from April to July, coincidental with snowmelt. The Yampa, White, and Duchesne Rivers contribute the majority of runoff, as Flaming Gorge Dam stores high flows of the Green River.

The Green River from Flaming Gorge Dam to Green River, Utah, ranges from a slow, meandering river with a shifting sand substrate to a swift, rapid-filled stream with cobble-boulder bottom in deep canyons. The meandering river averages 600 to 1,000 feet (183 to 305 m) in width, while the canyon area widths average 300 to 600 feet (91 to 183 m). River depth in the upper area averages less than 6 feet (1.8 m) with holes reaching 9 to 15 feet (2.7 to 4.6 m); depths in the canyon area extend to both lower and higher extremes. Water velocities vary considerably on both a seasonal and spatial basis, ranging from 2 to 10 feet (0.6 to 3 m) per second. Stream types vary from pool to riffle, with attendant variation in substrate type.

### WATER QUALITY

Under normal circumstances, water quality in the White River within the project area shows a marked seasonal variation. During the months of May through July, the river is low in total dissolved solids (TDS) and high in sediment load as normal TDS levels become diluted by heavy snowmelt. Conversely, TDS concentrations become high from September through February when groundwater becomes the primary source of flow (VTN Colorado, Inc. 1977).

In general, the water of the White River is hard and alkaline (VTN Colorado, Inc. 1975). TDS typically range between 200 and 700 mg/l. There are relatively high levels of turbidity, with specific conductance values normally ranging between 400 and 1,400 micromhos, indicating high salinity. Trace elements are found in unusually high levels, and coliform bacteria counts are generally at low to moderate concentra-

concentrations. Measurements of dissolved oxygen approach saturation levels throughout the year.

Water temperatures approach or reach freezing levels during the months of November through March. Water temperatures then gradually warm to a normal maximum of approximately 80°F (27°C) during July and August, dropping back to freezing levels by November. The maximum recorded water temperature is 88°F (31°C) at the Watson, Utah, USGS gaging station.

Sedimentation data has not been collected at the proposed dam site on the White River, but has been taken since 1974 at Ouray, approximately 50 miles (80 km) downstream. Grenney and Kraszewski (1980) calculated sediment load at Watson to be 2,200,000 tons/year. Considerable amounts of suspended sediments are present in the water throughout the reaches of the river.

Water quality in the Green River at Jensen, Utah, is slightly saline and typical for this area, averaging approximately 460 milligrams per liter (mg/l) in TDS, while values on the lower river at Green River, Utah, average approximately 550 mg/l. Water temperatures range from 32°F to 86°F (0°C to 30°C) during the year, due to solar heating. Average total sediment load at Green River, Utah, during Water Years 1984 to 1979 was 8,932,300 tons (USDI, Geological Survey 1981).

### Groundwater

#### HYDROLOGY

The Bird's Nest Aquifer is the principal aquifer within the project area. The thickness of the aquifer ranges from 90 to 205 feet (27 to 62 m) and averages approximately 115 feet (35 m) throughout the project area (VTN Colorado, 1975). Aquifer flow rates measured during drilling tests ranged from 0 to 700 gallons per minute and averaged 30 gallons per minute.

Water level fluctuations in test wells indicate the occurrence of recharge and discharge periods; however, data is inadequate to generalize about recharge characteristics. The potential for recharge is probably quite high in those locations where the aquifer is in contact with stream bottom alluvium, and both the White River and Evacuation Creek are known to receive water from the aquifer. The aquifer appears to be at equilibrium, wherein discharge equals recharge (VTN Colorado, Inc. 1977).

The majority of recharge to the aquifer would be by lateral movement from precipitation and runoff intercepted at outcrops. The relatively small surface area of outcrops, the low permeability, and the low structural gradient of the aquifer limit the rate at which recharge can occur (Bechtel Petroleum, Inc. 1981).

## Wetlands and Floodplains

True wetlands are sparse in the project area. No wetlands would be inundated by the reservoir; however, two small wetland communities are located along the White River approximately 37 and 48 river miles (60 and 77 km) below the proposed White River Dam site. These communities entail an area total of 115 acres (47 ha).

The floodplain portions of the project area are extensive, supporting a major riparian vegetation community and associated vertebrate animal communities. There are approximately 6,049 acres (2,448 ha) of riparian floodplain on the White River in Utah from the Colorado border to the confluence with the Green River. Approximately 995 acres (403 ha) of riparian floodplain lies within the area which would be inundated by the proposed White River Reservoir. An additional 4,575 acres (1,851 ha) of riparian floodplain exists downstream from the proposed White River Dam site to the confluence of the White and Green Rivers located near Ouray, Utah.

## VEGETATION

### Types

The vegetation of the White River project area can generally be classified as a cold desert type. As a result of two different research groups studying the vegetation of the project area, vegetation type nomenclature is not consistent. VTN Colorado, Inc. (1977) described four broad vegetation types on Federal Oil Shale Lease Tracts Ua and Ub which would be affected by all of, or part of, the project components of Alternatives 1, 3, 4, and 5. These broad vegetation types are riparian, sagebrush-greasewood, shadscale, and juniper. Allan (1979) described several vegetation communities along the proposed water pipeline corridor from the Green River to the White River (Alternatives 4 and 5) and in the vicinity of proposed borrow material sites and transmission line routes near Bonanza (Alternative 1). For the purpose of this EIS, Allan's vegetation communities are considered as variants of the four broad vegetation types described by VTN Colorado, Inc. (Table 3-4).

The overall range condition of the project area was considered poor by Allan (1979), Dastrup (1963), and VTN Colorado, Inc. (1977), but the BLM (Vernal District) considers the range condition overall to be fair to good (Evans and Wright 1981). On arid lands, such as the White River project area, improvement in range condition is slow due to low precipitation (less than 10 inches [25 cm]) and poorly developed soils.

The riparian type is restricted to streambanks, drainage areas, and areas along the White River with alluvial soils and abundant available water.

The sagebrush-greasewood and shadscale types are generally found in areas of relatively low relief, with sagebrush-greasewood occurring in depressions with relatively deeper soils. The major plant species occurring in both the sagebrush-greasewood and shadscale types are almost identical; however, the dominance of different species distinguishes one type from the other (Allan 1979, VTN Colorado, Inc. 1977). The juniper type occurs at higher elevations on shallow, poorly formed soils.

Figure 3-5 shows the location of the vegetation types at the White River Dam and Hell's Hole Canyon Dam alternative sites. The acreages of each potentially affected vegetation type for each alternative are presented in Table 3-5. The Environmental Profiles, Figures 3-11 to 3-14 (located at the back of this chapter), show vegetation types along linear features of the project alternatives. The borrow material sites are characterized by low-growing mat saltbush, creosote saltbush (Castle Valley clover), shadscale, and greasewood. The appearance of the sites ranges from nearly barren to sparsely vegetated with the above shrubs and annuals such as halogeton, Russian thistle, and desert trumpet.

### RIPIARIAN

Riparian communities located within the alternative project sites are generally comprised of cottonwood, salt cedar (tamarisk), greasewood, big sagebrush, rabbitbrush, willow, yellow sweetclover, pepper grass, salt grass, Western wheatgrass, and a variety of annuals.

### SAGEBRUSH-GREASEWOOD

The dominant shrubs in the sagebrush-greasewood communities within the project area are big sagebrush, greasewood, and shadscale. Other major shrubs include horsebrush, hop sage, and black sagebrush. Indian ricegrass and needle-and-thread grass are the major perennial grasses. Other species include snakeweed, rabbitbrush, and several annuals.

### SHADSCALE

The dominant shrubs of the shadscale communities are shadscale and big sagebrush. Other major shrubs include black sagebrush, greasewood, spiny hop sage, and horsebrush. Indian ricegrass, needle-and-thread grass, and galleta grass are the major perennial grasses in this vegetation type. Other species include rabbitbrush, snakeweed, milk vetch, and a variety of annuals.

### JUNIPER

Two juniper communities are found within the vegetation type, one on moderately sloping hillsides

TABLE 3-4

Grouping of Allan's Vegetation Communities Under  
the Four Broad Vegetation Types Described  
by VTN Colorado, Inc.

Juniper	Riparian	Sagebrush-Greasewood	Shadscale
Juniper	Riparian	Degraded Sagebrush- Grass	Mixed Brush
		Grassland	Saltbush
		Greasewood-Seepweed	Shadscale-Grass
		Sagebrush	
		Sagebrush-Grassland	
		Sand Dune Association	

Sources: Allan 1979 and VTN Colorado, Inc. 1977.

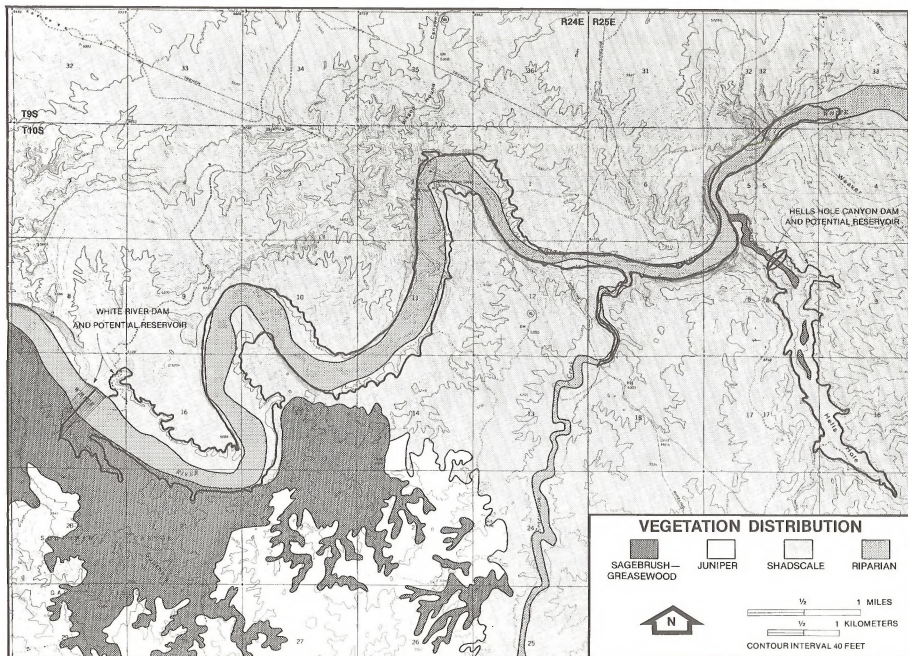


Figure 3-5  
**VEGETATION TYPE MAP FOR THE WHITE RIVER PROJECT AREA**  
 Source: VTN, Inc. 1977

TABLE 3-5

Acreages of Potentially Affected Vegetation Types  
for the Various Project Alternatives

Project Alternative	Vegetation Type <sup>a</sup>	Acres of Vegetation <sup>b</sup>
1. White River Dam and Reservoir	R <sup>c</sup>	995
Dam and Reservoir	S-G, S	547
Material Sites (off-site)	S-G, S	882
Access Roads		
To Dam (Alt. A)	J, S-G, S	58
(Alt. B)	J, S-G, S	49
Transmission Lines		
To Bonanza Power Plant	J, R, S-G, S	77
To Moon Lake Electric		
Assn. Power Line	J, R, S-G, S	102
White River to Confluence	R	4,575
3. Pumping From White River and Augmenting From Hell's Hole Canyon		
Dam and Reservoir	S-G	14
	S	261
Material Sites	J, S-G, S	Unknown
Access Roads and Power Lines	J, R, S-G, S	61
Pipeline and Pump Station	R, S-G	3.5
4. Pumping From Green River Pipeline, Access Road, and Power Lines	J, R, S-G, S	380
Pumping System	J, R, S-G, S	45
5. Pumping From White River and Augmenting From Green River		
Pipeline, Access Road and Power Lines	J, R, S-G, S	380
Pumping Station	J, R, S-G, S	105

Sources: Determined from vegetation type maps (Allan 1979 and VTN Colorado, Inc. 1977) and USGS topographic maps.

<sup>a</sup>Vegetation type symbols: J = Juniper, R = Riparian, S-G = Sagebrush-Greasewood, and S = Shadscale.

<sup>b</sup>Assume 80-foot corridor for access roads, 110 feet for pipelines, and 60 feet for power lines.

<sup>c</sup>Riparian acreages do not include river channel.

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and the other on steeply sloping hillsides. The communities are basically the same except for the disparity in topography and plant density. The communities are dominated by Utah juniper. Black sagebrush, shadscale, and big sagebrush are the major shrubs. Galleta grass and Indian ricegrass are the dominant perennial grasses. Other species include snakeweed, spurge, wild buckwheat, rabbitbrush, and several annuals. The juniper communities usually occur on sandstone outcrops above an elevation of 5,500 feet (1,675 m).

The water pipeline from the Green River to the White River (Alternatives 4 and 5) would involve 380 acres (154 ha), the majority of which is covered by shadscale, with small amounts of sagebrush-greasewood in the draws above the river and riparian areas along the banks of the Green and White Rivers. A limited amount of juniper vegetation type would be encountered along the proposed pipeline route.

### Productivity and Cover

Plant productivity data for the vegetation types in the White River Dam-Hell's Hole Canyon Dam area indicate that the three upland types (sagebrush-greasewood, shadscale, juniper) are similar in productivity, and that the riparian type is the most productive (Table 3-6). The differences in production between the riparian and upland areas are visually evident in Figure 3-6. No productivity data are available for the vegetation types along the water pipeline corridor from the Green River to the White River.

Another measure of environmental effects on vegetation types is the amount of bare ground in each type. The average plant cover for the three upland types (sagebrush-greasewood, shadscale, juniper) in the White River Dam-Hell's Hole Canyon Dam area is approximately 15 to 20 percent of the ground area, whereas plant cover in the riparian type adjacent to the White River is 80 percent (VTN Colorado, Inc. 1977). In a dry year, the amount of plant cover may fall below 10 percent in the upland areas (VTN Colorado, Inc. 1977).

### Threatened, Endangered, and Sensitive Plant Species

No Federally listed threatened or endangered plant species are known to occur in the project area. However, a population of a recently discovered species, *Pentstemon albilivis* has been identified in three locations; one of these locations occurs within the project area. This population is comprised of approximately 200 individuals and is located in 1 or 2 acres of the area that would be inundated. This plant has been given a category 1 status rating by the Fish and Wildlife Service (FWS). The species in category 1 are those for which the FWS has sufficient information to

support the biological appropriateness of listing as an endangered or threatened species. All plant species in this category are termed as sensitive by the BLM.

The Draft White River Dam EIS indicated that *Sclerocactus glaucus*, a Federally listed threatened species, occurred in the affected area for Alternative 1, the White River Dam and Reservoir. Plant taxonomists have since determined that the species was not correctly identified and occurs only in affected areas for Alternatives 4 and 5 (USDI, Fish and Wildlife Service 1981). Also, the sensitive plant species *Astragalus detritalis*, *Cymopterus duchesnensis*, and *Eriogonum viridulum* have been found to be locally abundant and dropped from consideration (category 3) by the FWS and are no longer being considered for listing as endangered or threatened (USDI, Fish and Wildlife Service 1980b).

## WILDLIFE

### Terrestrial Wildlife

There are two major groups of wildlife in the White River Dam area: true desert fauna adapted to an arid environment and fauna requiring access to surface water. The latter group are the most numerous and diverse. Distinct distributional patterns corresponding to vegetation type are evident for each group.

### MAMMALS

A total of 69 species of mammals have been found in the region. Their habitat preference and abundance are summarized in Appendix 7, Table A. Sixty-one species of game and nongame mammals are known to utilize the project area. These include 24 species of rodents, 16 species of carnivores, 14 species of bats, 4 species of rabbits and hares, and 3 ungulate (hoofed mammals) species.

Desert cottontail rabbits are the most numerous game mammal in the project area, occurring as high as 6,300 feet (1,919 m). They occur in all habitat types, although they are most abundant in sagebrush-greasewood. During low abundance they maintain their population along the White River (Grant et al. 1980).

Cottontails, chipmunks, mice, and woodrats provide the most stable prey base for carnivorous mammals, birds, and reptiles in the project area. Upland shadscale and sagebrush-greasewood habitats support more rodents and cottontails in normal years than do the riparian habitats. During drought conditions, however, small mammal numbers decrease dramatically in the upland areas and are maintained in riparian habitat. Following a drought, the upland areas are repopulated from the riparian population (Grant et al. 1980).

TABLE 3-6  
General Comparison of Production of Vegetation Types  
in the White River Dam - Hell's Hole Canyon Dam Area

Vegetation Type	Perennials (lbs/acre)		Annuals (lbs/acre)	
	1974	1975	1975	1976
Riparian	3,250	2,708	5,265	273
Sagebrush-Greasewood	1,667	1,466	456	189
Shadscale	1,163	1,165	2,002	34
Juniper	2,247	1,189	34	2.2

Source: VTN Colorado, Inc. 1977.

TABLE 3-7  
Raptors Found in the White River Dam Project Area  
From 1975-1979

	Habitat Preference <sup>a</sup>	
	Nesting	Foraging
PERMANENT RESIDENTS		
Sharp-shinned Hawk	U, R	U, R
Cooper's Hawk	R	R, U
Red-tailed Hawk	U, R	U, R
Golden Eagle	U, R	U, R
Northern Harrier		
(Marsh Hawk)	U	U
Prairie Falcon	U	U
Great Horned Owl	R	U, R
Burrowing Owl	U	U
Long-eared Owl	R	U, R
Short-eared Owl	U	U, R
Osprey	R	R
Screech Owl	R	U, R
SUMMER RESIDENTS		
Turkey Vulture	R	U, R
American Kestrel	U, R	U, R
WINTER RESIDENTS		
Goshawk	R	R, U
Rough-legged Hawk	U, R	U, R
Bald Eagle	R	R, U
TRANSIENTS		
Swainson's Hawk	U	U
Ferruginous Hawk	U	U
Peregrine Falcon	R	R
Merlin	R	R

Sources: Behle and Perry 1975b, Grant et al. 1980, Smith and Associates, 1979, VTN Colorado, Inc. 1977, Twomey 1972.

<sup>a</sup>U = Upland habitats, includes shadscale, sagebrush-greasewood, and juniper; R = riparian.



Figure 3-6

**AERIAL PHOTOGRAPH OF THE WHITE RIVER RIPARIAN COMMUNITY CONTRASTED WITH THE SURROUNDING UPLAND HABITATS**

## AFFECTED ENVIRONMENT

The riparian habitat also supports a beaver and porcupine population. Based on abundance estimates through 5 years (Grant et al. 1980), at least 176 beaver and 26 porcupine live along the stretch of river which the reservoir would inundate. Muskrat rarely occur in the project area.

The most numerous carnivores occurring in the project area are the coyote, badger, and striped skunk. Gray fox, ringtail, raccoon, and bobcat are uncommon to rare. Nine other carnivores occur in the region but not in the project area. The black bear, long-tailed weasel, and mountain lion are considered wanderers in the project area.

Mule deer are encountered in all habitat types. The riparian habitat on the White River is the focal point of deer activity from spring through fall. There are approximately 7,630 deer in the Book Cliffs Herd Unit which includes the project area. Estimated abundance of deer for the area which would be covered by the White River Dam and Reservoir ranges as high as 150 to 250 from 1975 to 1977 and as low as 75 to 150 from 1978 to 1979. Discussion with the Utah Division of Wildlife Resources (UDWR) (Drobnick 1980a) concerning deer abundance resulted in establishing the number 200 to represent the normal deer population of the proposed White River Reservoir basin (this represents approximately 2.6 percent of the Book Cliffs Herd Unit). The riparian habitat is critical for does who spend most of their fawning and nursing periods along the river corridor. Fawn production along the river is high for the Book Cliff Resource Area (VTN Colorado, Inc. 1977). The bucks inhabit the uplands near the river.

The deer move up the side canyons on the White River or out onto the benches to browse and return to the river bottom and side canyons during the day. The river bottom is not used by deer during the winter due to cold air drainage and shading from the canyon walls. Major wintering areas adjacent to the White River are depicted in Figure 3-7, as based on ground observation (Grant et al. 1980) and telemetry studies by UDWR personnel (VTN Colorado, Inc. 1977).

Pronghorn antelope are found north of the White River to Blue Mountain, the northeastern border of the Uinta Basin. Although Smith and Associates (1979) depict their distribution south of the White River, none have been sighted in this area (Grant et al. 1980, Olsen 1973, Ranck 1961). These antelope confine their activity to the bench areas and were only sighted along the White River during the 1977 drought (Grant and Kung 1979). Fawning grounds for pronghorn antelope cover an estimated 38,000 acres (15,378 ha). The area which would be traversed by the Green River Pipeline (Alternatives 4 and 5) and the location of borrow material Site 2 are critical fawning areas (Smith and Associates 1979).

## THREATENED, ENDANGERED, AND SENSITIVE TERRESTRIAL WILDLIFE

Although borrow material Sites 1 and 2 are within the historic range of the threatened black-footed ferret, no sightings have been made. Recent intensive surveys have found no indications of ferret presence. These factors indicate an extremely low potential for their presence in the area. It should be noted, however, that colonies of the white-tailed prairie dog, a food source for the black-footed ferret, occur in borrow material Sites 1 and 2 (Jensen 1981).

## BIRDS

Habitat preference and abundance of birds in the project area are summarized and referenced in Appendix 7, Table B.

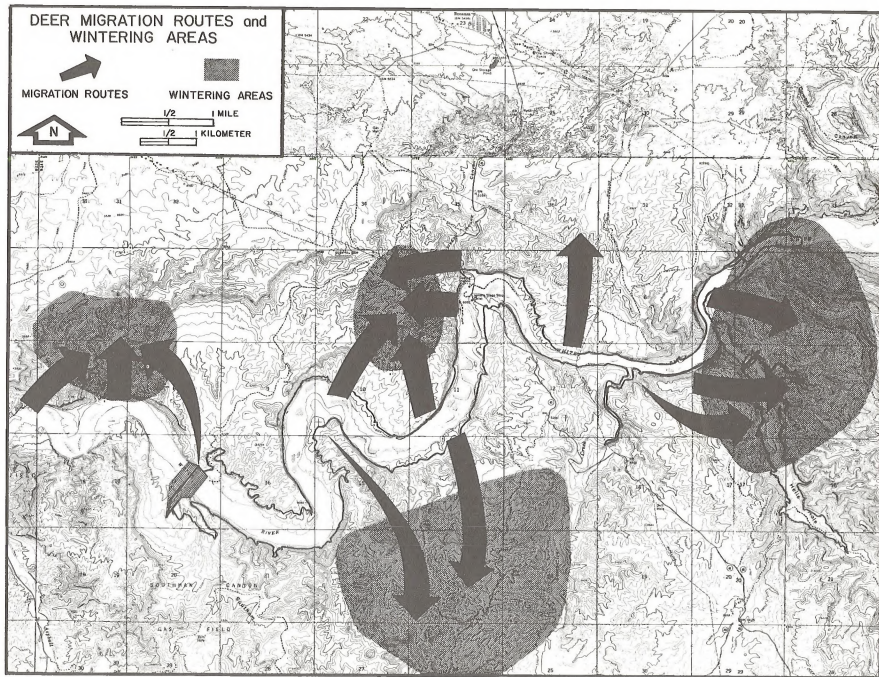
There are 186 species of nongame birds in the general region of the White River Dam. Forty-eight species of these birds are dependent on riparian habitat and occur along the Green River and its wetlands. From direct observation and published accounts, 138 nongame bird species have been encountered in the project area.

There are 21 raptor species in the project area (Table 3-7).

Of the 12 permanent and summer resident raptors, 8 nest in both riparian and upland habitats and four raptors are dependent on riparian habitat and nest along the White River. Nine of these raptors hunt in both upland and riparian habitats. The Cooper's hawk prefers hunting in riparian habitats. The other raptors prefer hunting uplands (i.e., shadscale, sagebrush-greasewood, and juniper habitats) since these areas can support a greater prey base and are more open (more bare ground within the plant community). However, when weather conditions changed from a good water year in 1975 to drought in 1977 and subsequent low prey base in the uplands in 1978 and 1979, the riparian habitat became a focal point for raptor activity. The most abundant raptors in this group are the red-tailed hawk, golden eagle, great horned owl, turkey vulture, and American kestrel.

Of the three winter residents, the goshawk and bald eagle are uncommon and prefer the riparian area along the White River. The rough-legged hawk is common in the bench area north of the White River where the pipelines would be constructed. This hawk is uncommon to rare along the White River. The four transients (Table 3-7) rarely occur in the project area. It may be that the ferruginous hawk nested in the bench areas north of the White River (Smith and Associates 1979).

The other 119 nongame bird species occurring in the project area are primarily passerines (perching, song bird types). All but 10 of these species depend on



**Figure 3-7**  
**WINTERING AREAS FOR MULE DEER ALONG THE WHITE RIVER**

Source: VTN, Inc. 1977

## AFFECTED ENVIRONMENT

the White River for nesting, foraging, water, or migratory rest stops. Twelve of these nongame birds have been observed consistently for 5 years (three permanent residents, eight summer residents, and one transient) and are obligates to the riparian habitat (i.e., they are found exclusively in riparian habitats and occur along the White River) (Grant et al. 1980).

Twenty-seven species of game birds occur in the project area: 21 species of waterfowl, four upland species, one shorebird, and one dove. The Canada goose is the primary waterfowl species nesting and rearing young along the White River. Mallards and green-winged teal are frequent transients and may have nested along the White during the 1977 drought. Gadwall, pintail, blue-winged teal, cinnamon teal, American widgeon, northern shoveler, and common mergansers use the river as a migratory stopover.

Upland game birds include sage grouse, California quail, ring-necked pheasant, and chukar. The quail are found along the Green River, Ashley Creek, and irrigation canals near Vernal, Utah. Sage grouse are found in the desert shrub north of the White River (Smith and Associates 1979). Their main concentration occurs on Blue Mountain (approximately 40 miles northeast of the project area) (Twomey 1942). Chukars, which were planted along the White River at Bitter Creek and Ignacio (Olsen 1973), have since disappeared from the river drainage. One chukar was recently seen near Hell's Hole Canyon (Grant and Kung 1979), indicating the possibility of a small population in this drainage. Ring-necked pheasants are concentrated in the agricultural sections of the Uinta Basin from Duchesne to Vernal. Olsen (1973) reports sightings at Ignacio Stage Stop along the White River, and Grant and Kung (1979) reported one hen and one cock in Wagon Hound Draw and Cowboy Canyon, respectively.

One shorebird, the common snipe, is an infrequent transient on the White River. Mourning doves, on the other hand, are common summer residents, nesting in the desert shrub and juniper woodlands and watering at the White River and scattered stock ponds and reservoirs.

### THREATENED, ENDANGERED, AND SENSITIVE BIRD SPECIES

There are three endangered birds residing in or visiting the White River Dam area: the whooping crane, the peregrine falcon, and the bald eagle. During the fall migration in 1976, one whooping crane was sighted flying south over the White River in a flock of approximately 300 sandhill cranes, and whooping cranes are occasionally reported in the Vernal-Jensen area. (About 20 whooping cranes probably use this flyway. [Drewein 1980].) These cranes are most likely birds experimentally raised at Gray's Lake, Idaho who migrate to New Mexico with their sandhill crane foster

parents. Their occurrence in the area would be limited to the riparian habitat, usually in the presence of sandhill cranes. Whooping cranes use the Green River Bottoms and other bodies of water from Vernal to the mouth of the White River as the only rest stop between Gray's Lake and the San Luis Valley of Colorado (Drewein 1980). Although whooping cranes are transients in the project area (Green River Bottoms), the probability of whooping cranes using the White River Bottoms in Utah is low.

Confirmed sightings of the peregrine falcon occurred in April and August, 1975. The spring sighting was made in Wagon Hound Canyon north of the White River. The summer sighting occurred near the proposed dam site on the White River. Peregrine falcons nest in the Dinosaur National Monument area. There are ample nest sites of prey birds in the sandstone cliffs near the river and, in 1975, avian prey abundance was at its peak (Grant and Kung 1979).

The bald eagle is a consistent winter resident along the White River, ranging from east of Meeker, Colorado, to Ouray, Utah. The eagles hunt along the river and in the adjacent shadscale habitat as far north as Bonanza, Utah, and along Evacuation Creek to the south. Peak abundance in the riparian habitat occurred in 1979 at 0.8 eagles per mile (0.5/km). The number of bald eagles which use the river within or near the proposed White River Dam Reservoir ranges from 3 to 10 during the winter. In Wagner's (1980) Survey for bald eagles, 15 were sighted along the White River from the Colorado-Utah state line to Asphalt Wash located a few miles downstream from the proposed dam site.

Three birds of Federal and State interest (sensitive species) occur in the area. At least one pair of Scott's oriole nested in the juniper woodlands and foraged in desert shrub south of the proposed dam site from 1975 to 1977 (Grant and Kung 1979). A few western bluebirds migrate through the area and occur primarily along the White River (Grant and Kung 1979). The golden eagle is a common resident occurring throughout the project area. The ferruginous hawk is a summer resident, occurring rarely in the project area.

### Aquatic Wildlife

#### WHITE RIVER

The area affected on the White River by the proposed White River Dam and alternatives extends from the Utah-Colorado border to its confluence with the Green River near Ouray, Utah. This segment of the White River is approximately 71 miles (114 km) long. Aquatic studies in the White River basin have been fairly intensive in Colorado. Past studies in the Utah section have been sporadic and of low intensity; however, recent studies by Lanigan and Berry (1979) have concentrated on the fishes in the area of the

## AFFECTED ENVIRONMENT

proposed reservoir basin and below. The most recent study by the FWS (1979-1981) includes the entire Utah section of the White River.

The White River is a typical Colorado Basin desert stream. The upper headwaters are clear, cool trout habitat, whereas the lower section is a turbid, warm desert stream. The aquatic biota of these two portions of the river are considerably different, due to different physical-chemical parameters.

The biota of the lower White River will be discussed in terms of producers and consumers:

1. **Producers:** The basic source of energy to the food chain, primarily plant material;
2. **Consumers:** Macroinvertebrates (the insects and other life forms inhabiting the stream bottom) and fishes.

The producers in the lower White River are various species of algae that grow attached to the rocks, primarily in riffles. They are collectively called periphyton and generally occur in low abundance in this section because of high turbidities reducing light penetration, high levels of scour due to a shifting sand bottom, and relatively few riffles. Periphyton density usually increases in late summer when flows are low and clearer (Holden and Selby 1979a, Hynes 1970). As is typical of rivers, no true plankton community grows in the White River. Macrophytes (rooted aquatic plants) are scarce in the White River due to turbidity and scour. Holden and Selby (1979a) noted dense clumps of narrow leaf pondweed (*Potamogeton* sp.) near Rangely, Colorado. They found small, scattered clumps in areas of low velocity with a silt substrate. Because of this lack of instream plant production, detritus (organic material washed in from the surrounding terrestrial community) serves as the major source of plant material for the stream ecosystem.

The macroinvertebrate community of the lower White River is also rather poor, for the same reasons mentioned above for periphyton (Baumann et al. 1975). Macroinvertebrates reach their greatest abundance in riffles (Hynes 1970), so the low number of riffles in the project area reduces the potential for large macroinvertebrate populations. The species present often represent remarkable adaptations for living in the harsh, desert stream they inhabit. Holden and Selby (1979a) found eight species of mayflies to be the most abundant macroinvertebrates in riffles in the White River near Rangely, Colorado.

### Fishes

Appendix 7, Table C, lists the 15 fish species found in the Utah section of the White River by recent investigators and notes their relative abundance and reproductive status. Of the fishes collected in the White, seven are native, the other eight introduced.

The introduced red shiner is the most abundant fish in the White River of Utah, but native species are also common (speckled dace, roundtail chub, flannel-mouth sucker) and reflect the natural state of the river habitat.

Most of the native species utilize slow water areas (backwaters, eddies) when they are young, but prefer eddies and runs as they grow older. Reproduction for most native species probably occurs in the riffles, although detailed spawning data is not available. Many of the introduced species, especially the minnows, reproduce in slower areas and spend most of their lives in that habitat.

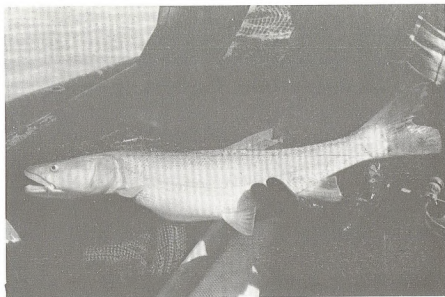
### Threatened, Endangered, and Sensitive Fish Species in the White River

Three endangered fishes have been found in the White River (Figure 3-8). One specimen of the humpback chub (*Gila cypha*) and one of the bonytail chub (*Gila elegans*) have been collected (Smith and Associates 1979). Another member of the humpback chub-bonytail chub complex (Holden and Stalnaker 1970) was collected in 1979 by Lanigan and Berry (1979). However, no humpback or bonytail chubs were collected by the FWS during their intensive 1981 field study. Therefore, neither of these species appear to utilize the White River except on rare occasions. Their habitat preferences are for large rivers and areas of fairly swift current (Vanick and Kramer 1969, Holden and Stalnaker 1975, Holden 1979).

Colorado squawfish (*Ptychocheilus lucius*) have been reported in the White River by local residents for a long time. The first published listing of squawfish from the White River was by Everhart and May (1973), who captured several in Colorado near the mouth of Piceance Creek. Carlson et al. (1979) caught two adults from the same general areas of the White River in 1979. Lanigan and Berry (1979) captured eight squawfish from the Utah section of the White River downstream from the proposed White River Dam in 1978 and 1979.

A FWS radio telemetry study of adult squawfish conducted during late spring and summer of 1980 noted several occurrences of these monitored fish moving up the White River (USDI, Fish and Wildlife Service 1980a). During the 1981 field season, FWS collected 51 squawfish, and this investigation found their upper range of distribution up the White River to be approximately 134 miles. All of the fish documented from the White River were subadult to adult fish; no young-of-the-year or juveniles were found.

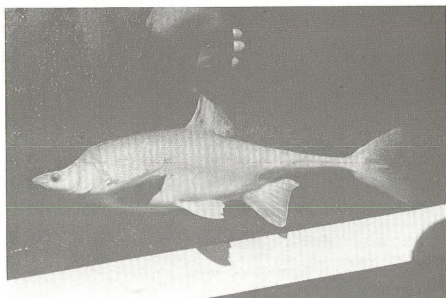
The general life history requirements of Colorado squawfish are not well known; however, studies have shown that they spawn in the Green River below Jensen, Utah (Holden and Stalnaker 1975, Holden 1979, Holden and Crist 1979, Holden and Selby 1979b).



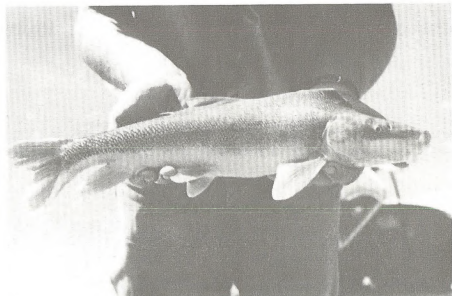
Colorado squawfish (Ptychocheilus lucius)



Humpback chub (Gila cypha)



Bonytail chub (Gila elegans)



Razorback sucker (Xyrauchen texanus)

Figure 3-8

RARE FISH OF THE GREEN AND WHITE RIVER SYSTEMS

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They prefer quiet backwater areas when they are young, but use various habitats as they grow older (Holden 1979, Holden and Selby 1979b). Although considered "large river" fish, squawfish have been found in all major tributaries of the Colorado River system, including the White, Duchesne, Yampa, and Dolores (Joseph et al. 1977). Holden and Selby (1979a) suggest that the tributaries may provide an abundant, natural food source for larger, fish-eating adults, resulting in seasonal or sporadic use of the tributaries. No young squawfish have been found in tributaries; therefore, it is assumed that spawning does not occur in this stream. The reason for use of tributaries such as the White is not clear.

The FWS conducted an additional 1-year's study of the endangered fishes and their habitat within the White River drainage. Field investigations began during the fall of 1980 and concluded November 30, 1981. This investigation found that squawfish apparently require habitat conditions typified by great seasonal fluctuations in flow, high turbidity and silt load, warm summer temperatures, and unrestricted movement to satisfy their migration needs. In addition, a suspected spawning site similar to that in the Yampa River was discovered. See Appendix 4, the FWS Biological Opinion, for details.

### GREEN RIVER

The potential area affected by the proposed White River Dam and alternatives is from the mouth of Walker Hollow to the Green's confluence with the Colorado River. The length of this segment of the Green River is approximately 275 miles (442 km).

This area includes two major types of habitat: a slow, meandering run with very few riffles and primarily a shifting sand substrate for 201 miles (323 km); and a canyon area with steep gradient, swift current, rapids, and riffles interspersed with runs and cobble and boulder substrate along with areas of sand for 74 miles (119 km). This latter habitat is in Desolation Canyon, about 50 miles (80 km) below the mouth of the White River (Figure 1-1). The slower sections include the area from Walker Hollow to Desolation Canyon and from Green River, Utah, to the confluence with the Colorado River.

A number of studies have recently been completed on the fishes in these portions of the Green River (Holden 1979, Holden and Crist 1979, 1980), and the FWS has completed an intensive study of Colorado squawfish and humpback chub. A recent study by Holden and Selby (1979b) summarized much of the fishery work to date and also investigated other parts of the aquatic ecosystem.

The producer and macroinvertebrate communities of the Green River are similar to those of the White. Few plankton and macrophyton are found. Periphyton

is limited in most of this area due to few riffles, except in Desolation Canyon. Abundance of periphyton is low in spring and high in summer (Holden and Selby 1979b).

Holden and Selby (1979b) took macroinvertebrate samples from cobble areas along shorelines between Walker Hollow and Ouray, Utah. Density of invertebrates was fairly low and the community was composed primarily of mayflies, midges, and caddisflies. More slow-water forms were noted than found in areas with more prominent riffles and swifter currents.

### Fishes

Appendix 7, Table D, lists the fishes that have been caught in several recent studies in the Green River below Walker Hollow and indicates their relative abundance and reproductive status. The fishery population is dominated by the introduced red shiner, which comprised 63 percent of the catch by Holden and Selby (1979b). Carp and fathead minnows are also common introduced species. The most common native species are flannelmouth sucker, bluehead sucker, and speckled dace.

Use of various habitats by different fish species was studied by Holden and Selby (1979b). Reproduction and habitat use is generally the same as in the White River, (i.e., slower areas are used by fish when young and more of the river proper is utilized as the fish mature). Channel catfish is the only game fish present in large numbers and having a naturally reproducing population.

### Threatened, Endangered, and Sensitive Fish Species in the Green River

Three endangered fishes, Colorado squawfish, humpback chub, and bonytail chub, and a species protected by the States of Utah and Colorado, the razorback sucker (*Xyrauchen texanus*), inhabit the Green River (Figure 3-8).

Reproduction of Colorado squawfish is known to occur throughout the affected area which also contains the largest remaining adult population (Holden and Stalnaker 1975, Holden and Selby 1979b). Habitat preferences of squawfish were discussed in the White River section.

A large, reproducing population of humpback chubs inhabit Desolation Canyon of the Green River (Holden 1979). This species prefers deep, swift areas of canyons although it is occasionally found in slower, noncanyon areas.

The bonytail chub is near extinction and was listed as an endangered species in April 1980 through emergency listing procedures. Recent collections in the Green River have either failed to find this species or have found only one or two individuals (Holden

## AFFECTED ENVIRONMENT

1979, Holden and Selby 1979b). Suttkus and Clemmer (1977) collected a juvenile bonytail chub near the town of Green River, Utah. Holden (1979) found one in Desolation Canyon.

Razorback suckers are also found throughout the area. Adults are fairly common; juveniles have only been reported once (Holden 1979). The razorback sucker is generally found in quiet, backwater areas, although Holden and Crist (1980) found a few in riffles in late summer. The lack of juveniles is perplexing because razorback suckers have been found in spawning condition in the Upper basin (McAda 1977), and adults can be rather common in some areas. The juveniles are similar in appearance to young flannelmouth suckers, an abundant native species. Perhaps the identity problem has artificially created the low catch success of young razorback suckers.

## RECREATION

The general area that would experience impacts to recreation from the White River Dam generally encompasses the Uinta Basin and surrounding areas. The five most frequently engaged-in outdoor recreation activities by residents of the Uinta Basin are, in order of preference, fishing, driving for pleasure, camping, big game hunting, and swimming. These activities fall in much the same rank order for all residents of the State of Utah (Institute of Outdoor Recreation and Tourism 1978). The vast majority of outdoor recreation activities participated in by Uinta Basin residents takes place in the Basin (see Table 3-8).

Ninety-five percent of the fishing occurs in the streams, small lakes, and reservoirs within the Basin, as well as in Flaming Gorge National Recreation Area. These areas are mainly cold-water fisheries for rainbow bow and brown trout.

Warm-water fishing (bass, bluegill) is available at Pelican Lake which is located approximately 24 miles (39 km) east and south of Vernal. The reservoir has been described as the best bluegill fishery in the State of Utah (Burdick 1979). The reservoir is fished year-round and averaged 7,700 fisherman days use per year from 1973 through 1977 (Burdick 1979). (A fisherman day equals one person fishing all or part of a day.)

Major outdoor recreation sites within the Uinta Basin include Flaming Gorge National Recreation Area, Dinosaur National Monument, the High Uintas Primitive Area, and the Ashley National Forest. Portions of all, with the exception of Flaming Gorge, include proposed wilderness areas. Developed recreation facilities at these locations and their use are summarized in Table 3-9.

Due to the high percentage of public land, the vast majority of land within the region is available for dispersed outdoor recreation including hunting, fishing,

sightseeing, backpacking, camping, picnicking, and ORV use. The higher elevations, especially portions of the Ashley National Forest, are available for cross-country skiing and snowmobiling. Boating occurs at Flaming Gorge National Recreation Area and several smaller reservoirs as well as portions of the Green River. The Yampa River and the Green River below Flaming Gorge Dam, in Dinosaur National Monument, and in Desolation and Gray Canyons, provide opportunities for whitewater boating.

Vernal and Roosevelt have active municipal recreation programs. Vernal has recently constructed a community indoor swimming pool.

## Project Area

The riparian areas along the river contrast with the high desert areas that border the canyon. The proximity of these areas creates contrasting vegetation associations, and one rare plant species (*Penstemon albiluvius*) occurs within the canyon. Such factors contribute to the recreational values and opportunities afforded by the area, particularly with regard to primitive recreation values.

The White River from the Colorado-Utah state line to its confluence with the Green is an Inventory River Segment which, as determined by the USDI, National Park Service (NPS), meets the criteria for study for inclusion in the National Wild and Scenic Rivers System. The criteria are:

1. That the river be free flowing (i.e., free of impoundments or other modification of the waterway).
2. That the river possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values.

In its Nationwide Rivers Inventory, the Heritage Conservation and Recreation Service (HCERS) determined that the Inventory River Segment of the White River met the free-flowing criteria and possessed recreational and fish and wildlife values that may be of national significance. The Inventory segment contains habitat for bald and golden eagles, peregrine falcons, and three endangered fish species. It also provides outstanding canoeing and rafting opportunities (USDI, HCERS 1981).

Therefore, the Inventory Segment, which includes the area of the White River affected by the proposed dam, would qualify for study to determine its suitability for addition to the National Wild and Scenic River System. Initiation of study requires specific designation by Congress or application by the Governor(s) of the state(s) concerned for inclusion in the system. Congress has not designated the White River for study nor has the Governor of Utah applied to have the river included in the System under provisions of the Wild

TABLE 3-8

Outdoor Recreation Participation  
by Residents of the Uinta Basin  
and All Utah Residents, 1976-1977

Activity	Uinta Basin Residents			All Utah Residents	
	Rank Order	Activity Occasions	Amount of Occurrence in Region	Rank Order	Activity Occasions
Fishing	1	162,200	95	2	23,248,600
Driving for Pleasure	2	138,300	75	3	21,607,800
Camping	3	127,600	90	1	76,984,600
Big Game Hunting	4	94,800	80	4	15,769,000
Swimming	5	90,000	95+	7	8,883,600
Bicycling	6	75,800	95+	10	7,550,100
Picnicking	7	74,700	85	5	9,775,500
Horseback Riding	8	70,800	95	16	4,887,500
Unstructural Play	9	70,500	95+	9	7,677,300
Basketball	10	66,700	95+	12	5,998,700
Hiking/Backpacking	11	57,500	90	11	7,281,100
Baseball	12	42,500	95+	17	4,511,700
Exercise/Gym Activities	13	42,500	85+		
Hunting	14	38,500	85	8	8,482,800
Other Spectator Sports	15	36,000	85	13	5,925,800
Power Boating	16	29,200	95+	18	4,365,400
Motorcycle Activities	17	27,600	95+	20	3,059,400
Playground Activities	18	27,600	80	25	2,336,800
Golf	19	27,100	95+	6	9,572,000
Tennis	20	24,400	95+	15	5,689,400
Skiing, Downhill	a			14	5,807,100
Fairs/Amusement Parks	a			19	3,104,800

Source: Utah Resident Outdoor Recreation Participation 1976-1977. Institute of Outdoor Recreation and Tourism, Utah State University.

<sup>a</sup>Not in top 35 activities.

TABLE 3-9

## Major Outdoor Recreation Sites Within the Uinta Basin

Administering Agency	Site	Opportunities	County
National Park Service	Dinosaur National Monument	Fossil excavations, camping, sightseeing, hiking, river rafting, Island Park Game Management Area.	Uintah
U.S. Forest Service	Ashley National Forest	Flaming Gorge National Recreation Area, High Uintas Primitive Area, Sheep Creek Canyon Geologic Area, Camping, hiking, boating, river rafting, hunting, fishing, snowmobiling, cross country skiing.	Daggett, Duchesne, and Uintah
Bureau of Land Management	Desolation and Gray Canyons	River rafting.	Uintah
	Drive Through the Ages	Geology, sightseeing.	Uintah
U.S. Fish and Wildlife Service	Browns Park	National Wildlife Refuge.	Daggett
	Ouray	National Wildlife Refuge.	Uintah
Utah Division of Parks and Recreation	Starvation Lake State Beach	Camping, fishing, boating.	Duchesne
	Steinaker Lake State Recreation Area	Camping, fishing, boating.	Uintah
	Big Sand Lake State Beach	Camping, boating.	Daggett
Other	Bottle Hollow Resort	Fishing, boating.	Uintah
	Pelican Lake	Fishing.	Uintah
	Montez Creek Reservoir		Uintah

Source: Hunt and Dalton, 1976.

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and Scenic Rivers Act. Therefore, the protections afforded by the Act do not apply.

At present there is limited, highly seasonal outdoor recreation occurring along or on the White River in Utah. There is no monitoring of that use. Hunting is limited to the fall, and water-oriented activity is limited primarily to the late spring and early summer.

### WATER-ORIENTED ACTIVITIES

#### Fishing

Limited fishing for channel catfish occurs in the White River in Utah. There are no estimates of fishing use.

#### Canoeing and Rafting

The White River in the project area is a canoeing recreational resource. The river normally offers good water conditions for novice canoeers, and small rafts are occasionally used. The high scenic quality of the White River Canyon is enhanced by the wildlife viewing opportunities (beaver, deer, raptors, nesting geese, etc.), few cultural intrusions, and several shaded and protected primitive camping areas.

During normal water years, river flows are generally excellent for spring and fall canoeing. During dry water years, river flows are generally good in the spring and poor to inadequate during the summer and fall. The White River is a silty, muddy stream year-round and gets noticeably muddier during high flows. The river has been canoed with flows of 250 cfs; however, at this flow dragging of the canoe is required at many locations.

At present the area's remoteness and relatively unadvertised nature limits the rafting and canoeing use. While there are no use figures available, current estimates range from 20-70 parties per year within the project area.

Parties typically launch their craft from the Ignatio Bridge or Cowboy Canyon (approximately 8 miles [13 ha] upstream from the Bridge) and float to Mountain Fuel's Bridge or the confluence with the Green. Each year, some deer hunting and very limited goose hunting (downstream from the dam site) is done by float trips.

### LAND-ORIENTED ACTIVITIES

#### Camping

Limited camping occurs in the project area, usually in conjunction with other outdoor recreation activities. Camping near the river occurs most often at Ignatio.

#### ORV Use

Off-road vehicles (ORVs) (motorcycle, 4-wheel drive) are used occasionally in the project area, primarily to gain access to the river. There are no ORV use estimates for the area.

#### Driving for Pleasure

Although there are no data, there is probably some pleasure driving within the project area, mostly associated with Utah Highway 45 and Ignatio Stage Stop.

#### Hunting

There is little upland game hunting along the White River in Utah. Limited hunting for mourning doves along the White River and for chukar partridge in Hell's Hole Canyon may occur.

The desert cottontail rabbit and mountain cottontail occur in the riparian habitat and higher elevations, respectively. There is some limited rabbit hunting in the area, estimated to be less than 50 hunter days. (A hunter day equals one person hunting all or part of a day.)

Some deer hunting occurs in the project area (100-240 hunter days per year). This small number is primarily a result of limited access and nearby hunting areas of higher quality.

The Bonanza Antelope Unit provides an average of 70 antelope hunter days annually in areas along the Green River Pipeline route, Alternatives 4 and 5.

Some waterfowl hunting occurs along the White River in Utah. The Green River is located closer to population centers in Utah and receives the majority of waterfowl hunting pressure in the region. Most waterfowl in the project area nest and move from the area before the hunting season. A liberal estimate of waterfowl hunting in the project area is 20 hunter days.

### VISUAL RESOURCES

The sites of the proposed White River Dam and the alternative Hell's Hole Canyon Dam and their associated reservoirs are located along the south edge of the Bonanza Planning Unit and the north edge of the Seep Ridge Planning Unit. The pipeline route for Alternatives 4 and 5 bisects the western portion of the Bonanza Planning Unit.

#### Scenic Quality

Flores Associates (1979) classified the scenery along the White River in the project area as Class A or the highest category. This classification was assigned because of the vegetation, wildlife, and unique landforms. Most of the Class A scenery within the region occurs along the White River and its side canyons. The most predominant landforms along the river in the

## AFFECTED ENVIRONMENT

Class A scenic area have been identified as being the "interesting rock formations, ranging from erosion-sculpted rock crests to tall spires, with both high vertical relief, and low bluffs and rolling hills." The river itself has been identified as being scenically important as well.

Class B scenery occurs northeast of the Bonanza Power Plant in the area encompassing the Devil's Playground. The area is a multicolored badlands with unique formations carved by erosive forces.

The area traversed by the pipeline route (Alternatives 4 and 5) is Class C scenery. The area is a rolling, sparsely vegetated upland plateau dissected by occasional dry washes.

### Visual Zones

The White River sections potentially affected by the alternatives are in the foreground/midground visual zone from the river, the principal travel route (Flores Associates 1979). The pipeline route from the Green River crosses several visual zones (Figure 3-9).

### Visual Sensitivity Levels

The White River and its canyon walls were classified as an area of medium visual sensitivity due to its potential as an accessible attraction for sightseers (Flores Associates 1979).

The areas bordering Utah Highway 45 are also classed medium sensitivity on the basis of the highway's average daily traffic count. This area includes borrow material Sites 1 and 2. The remaining areas affected by the alternatives have a low sensitivity level.

### Visual Resource Management Classes

Of most importance was the assigned Class II visual resource management classification given the White River and its surrounding bluffs (Figure 3-9), the highest classification given to any portion of the Bonanza Planning Unit. This results from the area's Class A scenic quality, foreground visual zone, and medium sensitivity level.

The visual resources along the route of the proposed Green River Pipeline are low quality except near the Green and White Rivers. The scenic quality is mainly Class C, sensitivity levels are low, the visual resource management classifications are IV and V, and distance zones are foreground and background. (See Appendix 8 for visual resource class definition.)

Borrow material Site 2 is in a Class III area and adjacent to the Devil's Playground. Site 1 is in a Class IV area.

## LAND USES, PLANS, AND CONTROLS

### Land Uses

There is currently limited human use of the White River and its associated canyons. There are no permanent residents nor croplands in the area.

### DOMESTIC LIVESTOCK GRAZING

Table 3-10 lists the 14 BLM grazing allotments in the project area. They are also shown in Figure 3-10. The allotments are for both sheep and cattle with most of the use occurring in winter and early spring. Additional grazing on private lands along the White River also occurs in the project area.

### WILDERNESS

The project area was studied for wilderness characteristics by BLM but was released from further inventory in August 1979 because of lack of wilderness characteristics, according to established criteria.

### WILD HORSES

Wild horses are found north of the White River and in a small area south of the river (Smith and Associates 1979). None have been encountered along the White River since 1974 (Grant et al. 1980), apparently because of stock ponds and reservoirs established after that time north of the river. The BLM estimates there are 34 wild horses which inhabit the bench area along the Green River Pipeline alternative.

### Land Use Plans

#### BLM

The White River Dam, reservoir, power plant and associated power transmission system, recreational facilities, and access roads are located within the area under the BLM Bonanza and Rainbow Management Framework Plans (MFPs) (1974) which guide public land administration and use. Each alternative in this EIS is included under the same MFPs.

The MFPs call for several items:

1. A detailed land use plan and environmental study before any major residential or industrial development takes place on oil shale discoveries;
2. New transmission lines would blend with the natural environment and would be placed in existing or planned corridors whenever possible.
3. No allowance of incompatible uses or development.

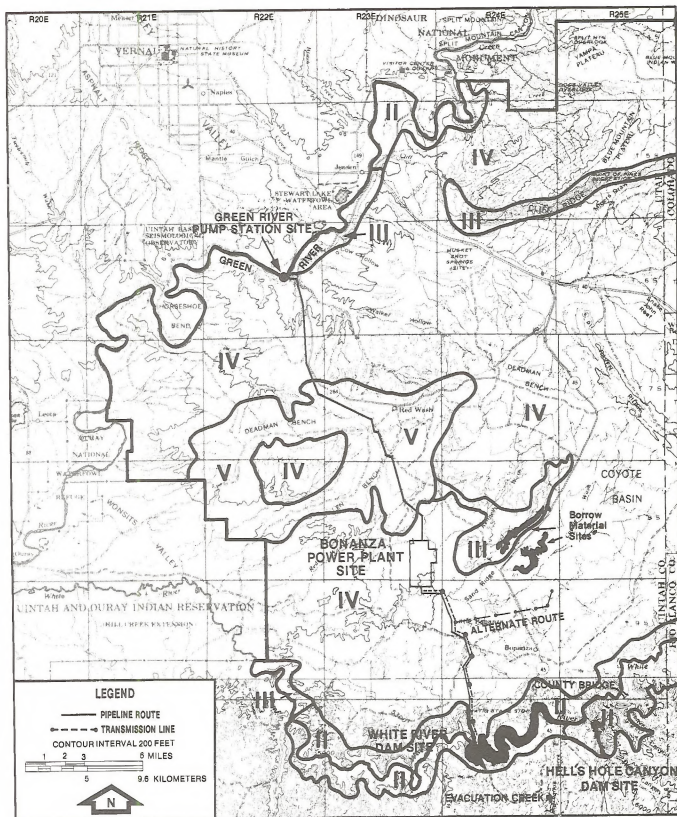


TABLE 3-10

## Grazing Allotments Within the Project Area

Grazing Allotment	Number and Class Livestock	Season of Use	Animal Unit Months (AUMs)	Allotment Range Condition	Ownership
Asphalt Draw	4,653 Sheep 682 Sheep	12/1 to 4/20 12/1 to 4/20	4,343 637	Fair	BLM State & Private
Olsen AMP	7,835 Sheep 2,920 Sheep	12/1 to 4/30 12/1 to 4/30	7,835 2,920	Fair	BLM State & Private
Bonanza	2,000 Sheep 247 Sheep	12/1 to 4/30 12/1 to 4/30	2,000 247	Fair	BLM State & Private
Walker Hollow	403 Cattle 18 Cattle	11/15 to 1/11 11/15 to 1/11	767 34	Fair	BLM State
Badlands	210 Cattle 30 Cattle	4/6 to 5/10 4/6 to 5/10	245 35	Poor	BLM State & Private
	208 Cattle 33 Cattle	11/1 to 1/17 11/1 to 1/17	535 85	Poor	BLM State & Private
Antelope Draw	7,015 Sheep 821 Sheep	11/25 to 3/31 11/25 to 3/31	5,893 695	Good	BLM State & Private
Baeser Wash	1,437 Sheep 226 Sheep	3/1 to 4/25 3/1/4/25	528 83	Good	BLM State & Private
	1,275 Sheep 195 Sheep	12/12 to 2/28 12/12 to 2/28	672 103	Good	BLM State & Private
White River Bottoms	106 Cattle 69 Cattle	6/1 to 10/15 6/1 to 10/15	477 311	Good	BLM State & Private
Seven Sisters	1,920 Sheep 430 Sheep	11/14 to 4/15 11/14 to 4/15	1,920 436	Poor	BLM State & Private
Stateline	2,516 Sheep 1,229 Sheep	11/25 to 4/25 11/25 to 4/25	2,516 1,229	Fair	BLM State & Private
Hell's Hole	2,664 Sheep 510 Sheep	1/1 to 4/15 1/1 to 4/15	1,865 357	Fair	BLM State & Private
Rabbit Mountain-Wagon Hound	2,250 Sheep 865 Sheep	1/1 to 4/20 1/1 to 4/20	1,650 634	Fair	BLM State &
West Deadman	1,618 Sheep 182 Sheep	11/1 to 4/30 11/1 to 4/30	1,942 218	Good	Private BLM State & Private
Little Emma	4,554 Sheep 1,047 Sheep	12/1 to 4/30 12/1 to 4/30	4,554 1,047	Fair	BLM State & Private

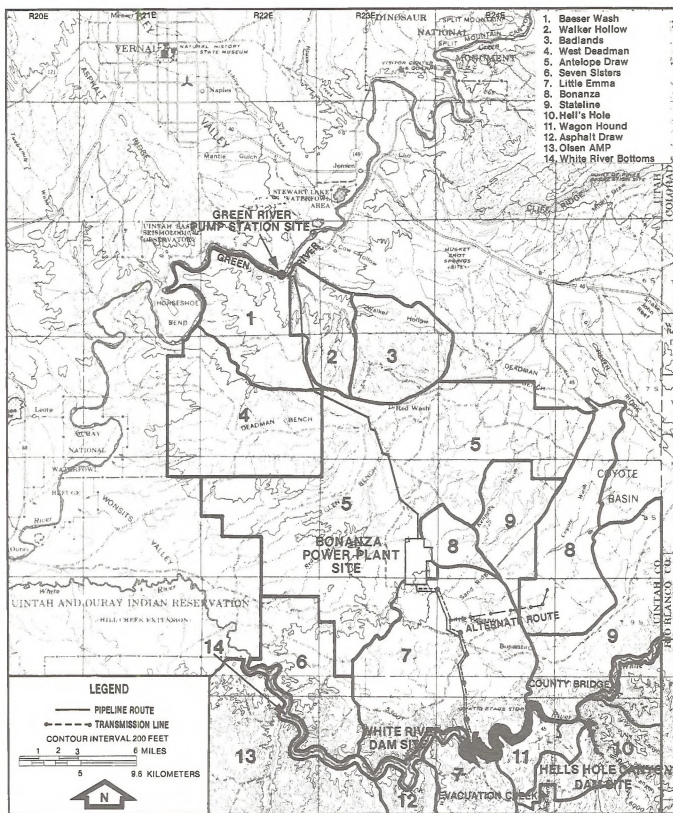


Figure 3-10  
**GRAZING ALLOTMENTS WITHIN THE PROJECT AREA**  
 Source: Bureau of Land Management 1980

## AFFECTED ENVIRONMENT

velopments on or adjacent to inventoried archaeological sites;

4. Preservation of open space and restriction of surface disturbances and man-made improvements which would detract from the natural environment and scenic quality of the area;

5. Exclusion of ORV use adjacent to the White River.

Nonconformance with BLM land use MFPs would be resolved through amendments to those plans. Inasmuch as the National Environmental Policy Act (NEPA) process is a form of planning, land use conflicts would be adjusted by decisions made on the basis of this Final EIS. A decision by the Federal government to implement the proposed project or an alternative would be a decision to amend the existing land use planning decisions. The Category 2 MFP amendment procedures, as outlined in BLM Instruction Memorandum No. 80-401, are used for planning amendments on BLM-administered lands. These procedures include a 30-day protest period in addition to the 30-day waiting period noted on the cover sheet of this Final EIS.

Vernal District planning objectives for the Bonanza and Rainbow BLM Planning Units provide for the development of energy resources.

### OTHERS

Development in Uintah County is governed by county zoning ordinances (1971) and the Uinta Basin Development Plan (1979) prepared by the Uintah Basin Association of Governments. The White River Dam and Reservoir and all proposed alternatives are within areas presently zoned for mining and grazing.

The State Division of Lands manages Utah State land in the project area without written land use management plans. However, state land actions generally agree with Federal and local land use plans and zoning.

## CULTURAL RESOURCES

### Archaeological Resources

Prehistoric cultural resources which have been recorded in the Uinta Basin of northeastern Utah indicate a sporadic but fairly continuous human occupation of the region for the past 10,000 years. Previous archaeological surveys and excavations undertaken in the area indicate the potential for remains of several cultural groups in the vicinity of the proposed project. Included here are cultural evidences for the Paleo-Indian "big game" hunters (ca 6,000-10,000 BC), Archaic hunter-gatherers (ca 6,000 BC-AD 350), Fremont agriculturalists (ca AD 950-1,200), protohistoric

Ute and Shoshoni hunter-gatherers, and Euro-American homesteaders and miners.

Several cultural resource surveys have been conducted in the vicinity of the proposed White River Dam alternatives (Berry and Berry 1975, Chandler and Nickens 1979, Nickens 1980, Laralde and Nickens 1980). As a result of these inventories, most of the area included within the proposed alternatives has been surveyed for cultural resources. There is one area, however, which has not been evaluated: A portion of the route of the alternative Green River to White River Pipeline which extends from the Bonanza Power Plant site southward to the White River.

Previous cultural resource surveys have recorded 32 cultural resource sites within or proximal to the proposed project area boundaries (Table 3-11). Twenty-five of these sites are found at the White River Dam and Reservoir location, five at the borrow material sites north of Bonanza, and two along the proposed Green River Pipeline route. Prehistoric lithic scatters consisting of stone artifacts and indicative of short-term, limited use occupations form the largest category of known cultural resources.

### Historical Resources

Three historic sites have been formally recorded in the project area. One, the Ignacio Stage Stop, a potential National Register candidate, is a component of the early twentieth century Uintah Toll Road between Dragon and Vernal. The stage stop consists of five buildings located on a small cliff overlooking the south bank of the White River. It was built about 1905 by the Uintah Railway and continued in use until 1935 when the railroad and toll road ceased to operate. The remaining two sites also appear to meet National Register eligibility criteria.

## HUMAN RESOURCES

The affected area is expected to center around the Ashley Valley in Uintah County, Utah. However, Rangely in Rio Blanco County, Colorado, might also be slightly affected, along with the small surrounding communities of Bonanza, Jensen, and Dinosaur.

Uintah County's economy is based primarily on petroleum, government, gilsonite, phosphate, and forest products. The anticipated development of a local synfuels industry is also becoming an important factor in the area's economy. Other industries include tourism, farming, and ranching.

### Population

The population of Uintah County has grown steadily from 12,684 in 1970 to about 20,506 in 1980, an increase of 61.7 percent, as compared to a 10-percent increase between 1960 and 1970. This increase is due

TABLE 3-11

## Known Cultural Resources Associated With Project Alternatives

Project Component/ Alternative	Total Number of Known Sites	Eligible to the National Register
Alternative 1 <sup>a</sup>	25	3
Alternative 3 <sup>b</sup>	0	0
Alternatives 4 and 5 <sup>c</sup>	2	0
Borrow Material Areas	5	0

<sup>a</sup>Berry and Berry 1975, Larralde and Nickens 1980.

<sup>b</sup>Nickens 1980.

<sup>c</sup>Chandler and Nickens 1979.

TABLE 3-12

Labor Force and Employment for Uintah County  
and the State of Utah  
November 1981 (Seasonally Adjusted)

	Total Labor Force	Employed	Total Unemployed	Percent Unemployment (1979)	1977 <sup>a</sup>
Uintah County	8,590	8,210	380	4.5	4.4
State of Utah	623,400	589,100	38,300	6.1	5.7

Source: Utah Department of Employment Security 1981.

<sup>a</sup>The Utah Foundation 1981.

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primarily to energy industry expansion throughout the 1970s and represents a compound annual growth rate of 5.5 percent. The approximate population for Vernal in 1980 was 6,600, up 68.9 percent from 1970 (U.S. Department of Commerce, Bureau of the Census 1981).

### Economic Conditions

Without development of the petroleum industry and tourism, the area probably would have continued in a relatively static or declining economic state during the early to mid-1970s because the major industries of agriculture, gilsonite, and phosphate mining were declining income industries.

### FINANCIAL RESOURCES

At the city and county levels, property taxes provide the main source of revenue. Property taxes in Uintah County by all governmental units were \$6,978,341 in 1980, a 214-percent increase from 1975 and a 302-percent increase since 1970. Assessed valuation in the county in 1980 was \$102.6 million, up 299 percent from 1970 (The Utah Foundation 1981).

The financial resource base of the Uinta Basin is relatively limited, as is the case for most sparsely populated rural areas. However, energy development growth has added significantly to private wealth, as well as to public sector revenues from sales and property taxes.

### LABOR FORCE AND EMPLOYMENT

Table 3-12 shows the labor force estimates for Uintah County and the State of Utah. As indicated by the table, county unemployment rates are lower than the state average. This trend is expected to continue if the area hosts economic growth including energy-related industry.

### HOUSING

The number of housing units in 1980 was 6,621 in Uintah County and 2,406 in Vernal City. These figures represent increases of 78 and 88 percent, respectively, from 1970 (U.S. Department of Commerce, Bureau of Census 1981).

Recent residential construction has improved the overall housing profile for the region, but it has not met the need for additional housing generated by the present influx of people.

Factors contributing to the housing shortfall include: high construction costs, high mortgage rates, inadequate family income, influx of construction and mining employment, and the risk associated with fluctuating populations in "boom town" situations.

## Community Services

### EDUCATION

The Uintah County School District has enrollments at grade levels 7-12 that exceed the system's designed capacity. The opening of a new elementary school in the fall of 1980 brought the capacity of elementary schools up to expected enrollments. Two more elementary schools are to be built by about 1983 and a new high school is in the planning stages (Henderson 1981).

### MUNICIPAL WATER SYSTEM

To meet additional water needs, Vernal has access to the Red Fleet Dam and Reservoir. This reservoir could supply the Vernal area water systems with 12,000 acre-feet of water for municipal and industrial use.

Throughout the district, potential water supply sources are presently being investigated. Federal grant and loan funding or direct development by Federal agencies is anticipated. A bond proposal was passed in 1979 to upgrade the system and work is underway (Henderson 1981). The Vernal system has a conditionally approved state health rating pending completion of the purification plant currently under construction.

### MUNICIPAL WASTE WATER FACILITIES

The City of Vernal has a waste water treatment plant with a capacity of 2.7 million gallons per day (mgd) and a design population equivalent of 7,500 people. The average daily flow is 1.7 mgd.

The area has received a \$6.8-million grant from the Environmental Protection Agency and State funds for a new sewage treatment lagoon system and new sewer lines. Construction began in March of 1980 and should be completed in 1982. The new plant is designed to accommodate a population of about 20,000 people with provisions for modifications to more than double this capacity (Henderson 1981).

### FIRE PROTECTION

The City of Vernal is served by an all-volunteer fire department with 20 active members. Their equipment consists of two 1,250-gallon-per-minute pumps, one 750-gallon-per-minute pumper, and one 500-pound powder unit.

Fire protection class ratings range from 1, the most adequate, to 10, the least adequate. The City of Vernal has a class rating of 6.

## AFFECTED ENVIRONMENT

### LAW ENFORCEMENT

Law enforcement is administered by the Uintah County Sheriff's Department, the Vernal Police Department, and the Utah State Highway Patrol. A 6-cell detention facility is operated by the Uintah County Sheriff's Department.

### HEALTH FACILITIES AND PERSONNEL

Vernal has three medical clinics and a 31-bed hospital. Vernal has no free or nonprofit clinics. The hospital is fully equipped for surgery and is currently being underutilized. Ambulance service is provided by Uintah County.

### Quality of Life

#### COMMUNITY HOMOGENEITY

Historically, communities in Uintah and Duchesne Counties have been culturally homogeneous and have valued neighborliness, friendliness, mutual self-help, close family ties, family pride, economic independence, local autonomy, and a strong religious life. Recent development has reduced this cultural homogeneity. Native residents perceive these as outside influences.

#### PUBLIC ATTITUDES

Most of the general population of Uintah County either have not expressed an opinion or are in favor of the White River Dam Project. People who live outside the county have expressed both support and opposition to the project.

Hawkins (1979) found that most Utes on the Uintah and Ouray Indian Reservation perceive the White Riv-

er Dam as a potential threat to their socio-political structure and are opposed to the project, as well as other dams on the White or Green River systems. Historically, irrigation projects, including those approved by the tribal council, have polarized the tribe into political factions.

### QUALITY OF LIFE INDICATORS

Conservative social attitudes and emphasis on strong family ties have helped maintain low to average divorce rates in the area. Divorce rates were 3.6 per 1,000 population for Uintah County in 1975, 6.2 per 1,000 for 1976, and 4.7 per 1,000 for 1977 (Utah Bureau of Health Statistics 1977).

In relation to the population, juvenile delinquency appears to be a substantial problem in the impact area. Uintah County reported 455 offenses in 1978 (Utah Bureau of Organized Crime and Criminal Identification 1978). In contrast, low incidence of high school dropouts is indicative of the traditional emphasis given to formal education.

In the last 3 years, Uintah High School (Vernal) had 38 dropouts out of an enrollment of 866 (Uintah High School 1979).

There are low incidences of crime, as would be expected in a rural area.

### LINEAR FEATURE PROFILES

Existing environmental features along proposed linear features are noted in Figures 3-11 to 3-14. These include two transmission lines and two access roads associated with the White River Dam and the Green River Pipeline. A key to abbreviations used precedes the figures.

(FIGURES 11-14)

LINEAR FEATURE PROFILES - KEY

Vegetation

C Cultivated  
CD Cold Desert Shrub  
F Forest  
MB Mountain Bench  
PJ Pinyon-Juniper  
R Riparian Crossing  
W Wetlands

Endangered or Threatened (E&T)  
Plants/Habitat

H E&T Habitat  
HP E&T Potential Habitat

Visual Features

Scenic Quality

A High  
B Medium  
C Low

Sensitivity

H High  
M Medium  
L Low

Visual Zones

F Foreground  
M Middleground  
B Background  
SS Seldom Seen

Land Use as Stated

Land Ownership

BLM or Bureau of Land Management

FS Forest Service  
I Indian  
P Private  
S State  
M Multiple Ownership

Special Animals

1. Critical E&T Habitat  
2. Critical Habitat for Rare  
Colorado Cutthroat Trout  
  
BE Bald Eagle  
GE Golden Eagle  
H Wild Horse  
R Raptor Area  
WC Whooping Crane

Game Animals

3. Critical Trout Habitat  
4. High Priority Trout Habitat  
5. Substantial Trout Habitat  
6. Limited Trout Habitat  
7. Limited Channel Catfish  
Habitat  
A Antelope  
D Deer  
E Elk  
F Waterfowl  
M Moose  
SG Sage Grouse  
ST Sharptail Grouse

Paleontological Resources

H Potentially High  
Significance  
M Potentially Medium  
Significance  
L Low Significance  
N Negligible Significance

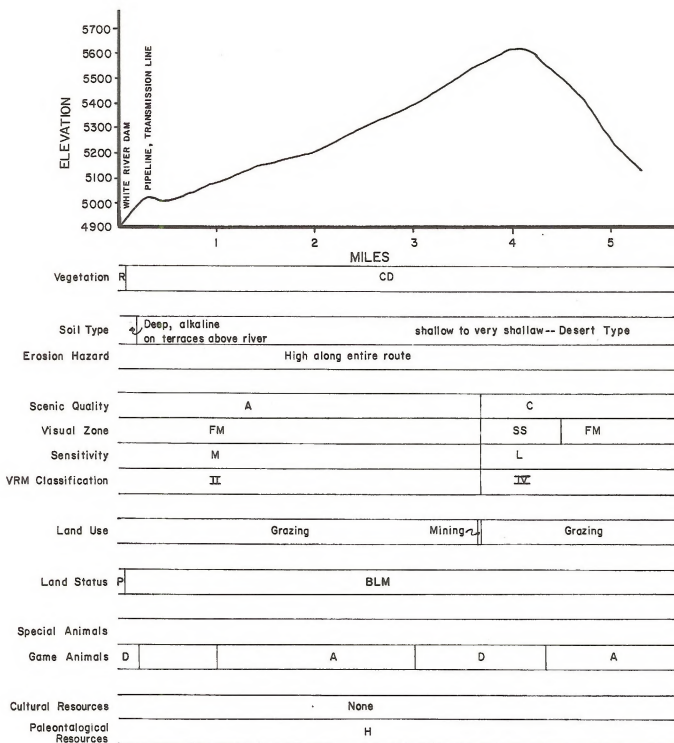


Figure 3-11  
LINEAR PROFILE FOR ALTERNATIVE A, ACCESS ROAD FROM BONANZA

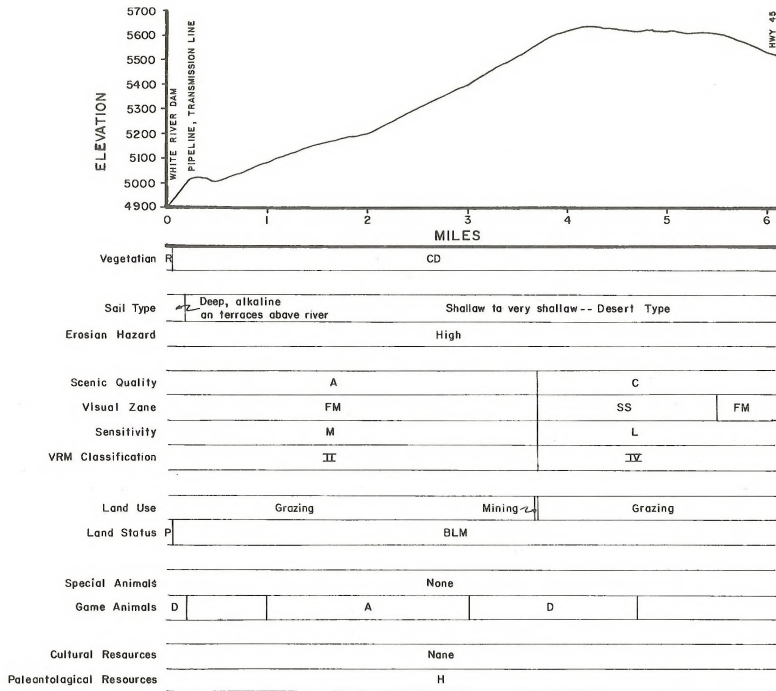


Figure 3-12  
 LINEAR PROFILE FOR ALTERNATIVE B, ACCESS ROAD FROM HIGHWAY 45

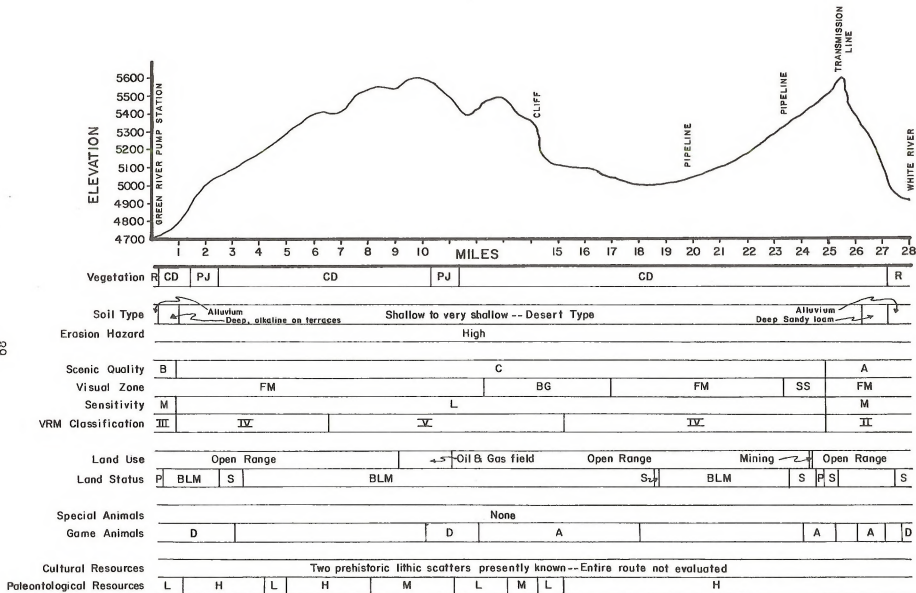


Figure 3-13

LINEAR PROFILE FOR GREEN RIVER PIPELINE AND TRANSMISSION LINE TO BONANZA POWER PLANT, BONANZA SITE

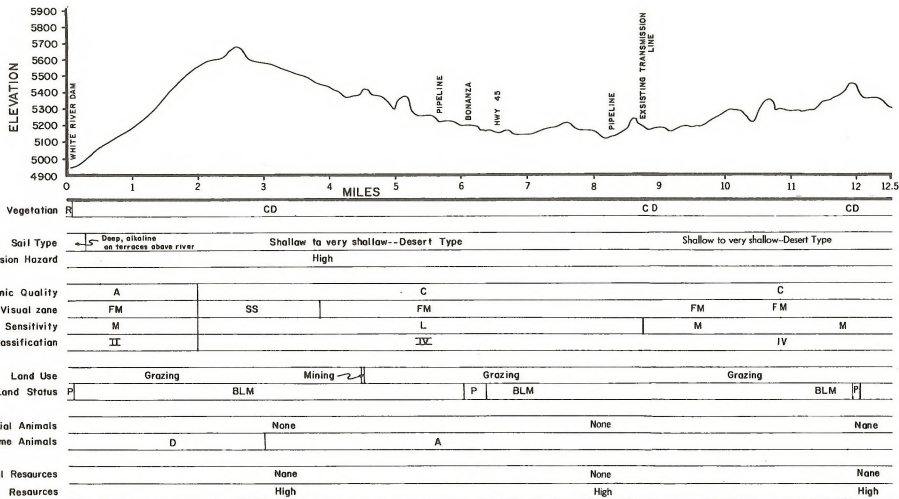


Figure 3-14

LINEAR PROFILE FOR TRANSMISSION LINE FROM WHITE RIVER DAM TO EXISTING TRANSMISSION LINE

## CHAPTER 4

# ENVIRONMENTAL CONSEQUENCES

### INTRODUCTION

This chapter evaluates the environmental impacts that would be expected from construction and operation of the White River Dam or its alternatives. The impacts discussed are those that would significantly affect the quality of the human environment. An impact is considered significant if it:

1. Is controversial;
2. Is of high public interest or concern;
3. Substantially affects the human environment; or
4. Concerns a subject protected by law.

Magnitude, incidence, and duration of impacts are indicated where possible. National, regional, or local importance of impacts are also indicated in some instances.

The discussion is presented by alternatives. Each alternative is discussed by resource category in a systematic 3-step analysis process:

1. Using information on the existing environment presented in Chapter 3, the anticipated impacts are identified; then
2. Known mitigation measures are discussed as they may reduce the impacts; then
3. Residual unavoidable adverse impacts are identified.

The impact analysis takes into account the effectiveness of the mitigative measures. Mitigation is designed to be as effective as possible, while considering the practicality of measures. Mitigation would not eliminate all adverse impacts caused by the proposed project. (Table 2-1, located at the back of Chapter 2, provides a comparative analysis of the alternatives and summarizes the unavoidable adverse impacts, irreversible and irretrievable commitments, and the effect of short-term use of the environment on its long-term productivity.)

Climate, air quality, and topography are not discussed in this chapter, since none of the project alternatives affect these features to any extent. Table 4-1 lists the various alternatives and indicates the acres of land disturbed and occupied by project feature. Figure 4-1 shows land ownership in the project area for all alternatives.

### ALTERNATIVE 1: WHITE RIVER DAM AND RESERVOIR

#### Geology

##### ANTICIPATED IMPACTS

The "anchoring" of the dam in the jointed Uinta Formation is a matter of concern but it is one that could be remedied if difficulties were recognized in advance and necessary action taken in design and construction (Ritzma 1980).

Although there has been a recent history of seismic events near the project area, Bingham Engineering (1981a) concluded that there is low seismic risk inside the project area.

##### MITIGATION

Proper design and construction would minimize seismic risk and problems of anchoring dam in the jointed Uinta Formation (Ritzma 1980). The responsibility for dam integrity and safety rests with the Utah State Engineer.

##### UNAVOIDABLE ADVERSE IMPACTS

None.

#### Minerals

##### ANTICIPATED IMPACTS

The White River Dam and Reservoir would inundate 11 existing oil and gas leases as well as 5 pre-1920 unpatented mining claims and a portion of potentially recoverable oil shale deposits. The reservoir would hinder the exploration and use of the oil and gas leases and could prohibit the development of the mining claims. The loss of resources resulting from this action is unquantifiable. About 165 acres of Oil Shale Tracts Ua and Ub would be inundated. Phillips (1980) concludes that the reservoir would not limit the mining of oil shale on all other parts of Tracts Ua and Ub; however, it is not known what consequences, if any, would result from possible hydrologic effects of subsidence along the north edge of the Federal lease area.

According to the Utah Geological and Mineral Survey (1976):

Perhaps as much as 1,000 feet of the oil shale on each side of the White River will be lost to mining for this distance. Using an average saturation distance of 1,000 feet (it could be more) and an average thickness of 100 feet for the rich oil shale, a total of 81.5 million cubic yards would be lost.

TABLE 4-1

Number of Acres Disturbed and Occupied for Each Alternative by Land Ownership

	Disturbed					Occupied				
	Total	BLM	State	Private	Ind.	Total	BLM	State	Private	Ind.
<u>ALTERNATIVE 1 - White River Dam</u>										
Dam, Spillway, and Power Plant	122	34	--	88	--	122	34	--	88	--
Reservoir	1,980	640	310	920	110	1,980	640	310	920	110
Transmission Lines										
To Bonanza PP	77	49	13	15	--	23	15	4	4	--
To Moon Lake Electric Assn. Power Line	102	76	15	11	--	31	24	4	3	--
Access Roads										
Alternative A	58	57	0	1	--	15	14	0	1	--
Alternative B	49	47	0	2	--	13	13	0	<1	--
Borrow Material Sites	882	882	0	0	--	0	0	0	0	--
Recreation Sites										
Ignatio Bridge	3	0	0	3	--	2	0	0	2	--
Below Dam	2	0	0	2	--	1	0	0	1	--
North of Dam	2	2	0	0	--	2	2	0	0	--
Total <sup>a</sup>	3,117	1,654	323	1,030	110	2,143	704	314	1,015	110
<u>ALTERNATIVE 3 - Hell's Hole Dam and Reservoir</u>										
Dam and Reservoir	275	69	0	206	--	275	69	0	206	0
Pumping Station and Pipeline	3.5	3.5	0	0	--	2	2	0	0	--
Power Distribution Line	22	11	5.5	5.5	--	6.7	3.5	1.6	1.6	--
Access Roads	39	5	0	34	--	20	2.6	0	17.4	--
Total	339.5	88.5	5.5	245.5	--	303.7	77.1	1.6	225	--
<u>ALTERNATIVE 4 - Pumping From Green River</u>										
Pipeline	380	316	37	27	--	34	29	3	2	--
Pump Stations	45	45	0	0	--	45	45	0	0	--
Power Distribution Line	Included in above figures.					15	13	2	0	--
Total	425	361	37	27	--	94	87	5	2	--
<u>ALTERNATIVE 5 - Pumping From White River and Supplementing With Water Pumped From Green River</u>										
Pipeline	380	316	37	27	--	34	29	3	2	--
Pumps	105	75	30	--	--	105	75	30	0	--
Power Distribution Line	Included in above figures.					15	13	2	0	--
Total	485	391	67	27	--	154	117	35	2	--

<sup>a</sup>Totals based on the proposed Alternative B access road and the Bonanza Power Plant transmission line.



## ENVIRONMENTAL CONSEQUENCES

This would amount to more than 2 billion gallons (47.6 million barrels) of shale oil.

However, using the "Guidelines for Mining Under Surface Water, Phase III and Final Report" (U.S. Department of Interior [USD], Bureau of Mines 1976), mining and excavation of oil shale under the proposed reservoir would be technically possible, although perhaps economically prohibitive. The impact to oil shale losses could then be reduced. The amount of potential loss that would be reduced is unquantifiable at the present time.

Access road Alternative A crosses eight oil and gas leases, Alternative B crosses seven; neither alternative crosses unpatented mining claims.

The transmission line to the Bonanza Power Plant crosses eight oil and gas leases, the route to the existing Moon Lake Electric Association transmission line crosses 14 leases. Neither route would cross unpatented mining claims. Impacts to the leases or claims by these linear features would not adversely impact the ability to explore or recover the potential resources, except for a short period during construction.

Gilsonite and tar sand are significant mineral resources in the project area; however, this alternative would not affect their recovery or use.

### MITIGATION

Any adverse economic impacts associated with oil and gas leases and mining claims would be mitigated by a fair compensation to the lessors or locators or by other arrangements made by the Utah Department of Natural Resources and Energy on behalf of the Utah Department of Water Resources prior to construction. It is not fully known what exploratory work has been done to estimate locations, quantities, and kinds of minerals that could be affected.

### UNAVOIDABLE ADVERSE IMPACTS

Up to 47.6 million barrels of shale oil and an unquantifiable amount of other minerals would not be extracted during the life of the project in the 1,980 acres (801 ha) inundated by the reservoir.

### Paleontology

#### ANTICIPATED IMPACTS

Direct impacts on important fossils would result from construction activities of the dam and spillway and inundation by the reservoir in 2,102 acres (851 ha). Roadway improvements, new road construction, borrow material removal, and power line construction could also directly impact important fossil material in another 1,042 acres (422 ha).

Construction activities associated with the proposed dam could disturb the position and relationships of fossils and result in the loss of scientific and educational values. The greatest impact would be in those formations with potential for high paleontological significance (Green River and Uinta Formations). However, with the measures required of the applicant by Federal agencies for protection of paleontological resources, construction activities could provide new paleontological information. New access into the area would allow rockhounding in remote areas and result in an unquantifiable loss of paleontological resources which have scientific and educational values.

Increased collecting and removal of known fossils in the region would likely result from increased numbers of people associated with the proposed project. Such activity is impossible to quantify but scientifically important fossils could be removed from location without proper documentation of information. Scientific and educational values would be lost, the significance of which is unknown. There would remain a high potential for inadvertent damage to subsurface fossils on disturbed areas.

### MITIGATION

The applicant would obtain the services of a qualified paleontologist approved by the appropriate Federal official. The paleontologist would conduct an intensive survey of all areas to be disturbed which have high potential for paleontological resources. The paleontologist would be available, as needed, during surface disturbance. If the paleontologist determined that paleontological values would be lost, construction would be halted until appropriate records or salvage action could be taken.

The paleontologist would be able to reduce the loss of information to paleontological resources by recording scientifically important data.

### UNAVOIDABLE ADVERSE IMPACTS

Even with the suggested mitigation, some unavoidable loss of fossils potentially important to science could occur in 3,144 acres (1,272 ha).

### Soils

#### ANTICIPATED IMPACTS

The construction and vegetation clearing associated with the dam in Alternative 1 would increase soil loss through erosion on about 122 acres (49 ha). Vegetation clearing in the reservoir basin would also increase soil loss through erosion.

The construction of access roads, power lines, borrow material sites, and recreation sites would disturb vegetation on the acreages indicated in Table 4-1.

## ENVIRONMENTAL CONSEQUENCES

This would lead to increased erosional losses on about 1,015 acres (411 ha), especially on steep slopes which occupy about 40 percent of the project area. Therefore, increased erosion could be experienced on at least 1,137 acres (460 ha).

### MITIGATION

The Bureau of Land Management (BLM) would require a revegetation program to stabilize disturbed soils by construction activities and excavation of borrow material sites. All borrow areas (except for the inundated area) would have vegetation and topsoil removed and stockpiled into two separate piles for use during revegetation. Later, topsoil would be replaced, seeded, and vegetation litter placed on top to enhance the revegetation efforts. A permanent revegetation program, involving seeding and transplanting native plant species adapted to the project area, would be used for disturbed soil areas above the reservoir high water line or outside the dam and reservoir areas (Institute for Land Rehabilitation 1971a, 1979b). Erosion on slopes would be minimized by construction of waterbars on grades over 4 percent where vegetation was disturbed or removed, unless otherwise determined by BLM.

Impacts resulting from disturbances by the various alternatives could include: an unquantifiable loss of topsoil and subsoil, increased overland water flow, increased sediment production, formation of rills and gullies, and unearthing and silting-in of plants. A loss of topsoil and subsoil would expose geologic parent material and hinder natural and artificial revegetation. Bare soils and developing water channels would increase overland water flow, and hence increase the erosive force and sediment load of the moving water.

### UNAVOIDABLE ADVERSE IMPACTS

Unavoidable impacts resulting from disturbances by the various alternatives could include: an unquantifiable loss of topsoil and subsoil, increased overland water flow, increased sediment production, formation of rills and gullies, and unearthing and silting-in of plants. A loss of topsoil and subsoil would expose geologic parent material and hinder natural and artificial revegetation. Bare soils and developing water channels would increase overland water flow, and hence increase the erosive force and sediment load of the moving water. These impacts would be short term, occurring only during and immediately after construction. An unquantifiable amount of soil could be lost through erosion on at least 1,137 acres (460 ha). The duration of loss would extend through a few years or several decades, depending on the severity of the disturbances. Total removal of existing soils would cause impacts for several decades as soil rebuilds very slowly in this area.

## Water Resources

### DOWNSTREAM FROM THE PROPOSED DAM

#### Anticipated Impacts

Construction of the proposed White River Dam and Reservoir would impact the water resources of the White River downstream from the dam and the Green River below the confluence by diverting certain quantities of water from the system for consumptive uses. Expected depletions from the rivers in terms of "normal" and "worst-case" conditions are provided for Alternatives 1, 3, 4, and 5 in Tables 4-2 and 4-3, respectively. The values used for this portion of the tables were based upon computer simulations prepared by the Utah Division of Water Resources (1982). The amount of water involved in this analysis (Alternative 1) assumed an annual consumptive use for energy development of 75,000 acre-feet (104 cubic feet per second [cfs]) on a continuous basis and approximately 5,500 acre-feet for evaporation, as indicated in Chapter 2. These simulations include no developments other than the White River Dam, and would change upon the inclusion of any other water development in Colorado on the White River and/or downstream water resource development.

The reduction in flows during normal years (Table 4-2) would generally range from 90 to 130 cfs. Natural flows could be augmented any time during the year by the reservoir operation as directed in the US Fish and Wildlife Service (FWS) Biological Opinion. Water would be stored in the reservoir primarily during spring runoff. A minimum release of 250 cfs or the flows recommended in the Biological Opinion (see Appendices 3 and 4) would be maintained to meet power generation needs and downstream water rights. During low flow periods, represented by the worst case on record (1976-1978), releases would be the actual flow of the river or that specified in the FWS Biological Opinion (Table 4-3). Flows in the White River would be depleted about 20 percent during most months in normal flow years, but this would increase to 30 percent during most months in low flow years.

These depletions would not have any effects on existing water rights, since the only present downstream users on the White River are the Ute Indians and their water right (see Appendix 3) would be allowed to pass the reservoir. The water depletion from the White River Dam for energy development would be a portion of the water allocated to the Utah Board of Water Resources under the Colorado River Compact.

Loss of flows in the Green River would be less significant than those from the White due to the moderating effect of the larger Green River. In normal flow

TABLE 4-2

Normal Water Depletions Under Various Alternatives  
(1931-1980 Period of Record)

Month	White River					Green River				
	Normal Mean Flow at Watson Gage (cfs)	Reduction in River Flow <sup>a</sup> (cfs)				Normal Mean Flow at Green River Utah (cfs) <sup>b</sup>	Reduction in River Flow <sup>a</sup> (cfs)			
		Alt. 1 <sup>c</sup>	Alt. 3	Alt. 4	Alt. 5		Alt. 1 <sup>c</sup>	Alt. 3	Alt. 4	Alt. 5
Oct.	426	117	98	0	97	3,247	117	98	97	97
Nov.	396	103	97	"	"	3,373	103	97	"	"
Dec.	349	84	97	"	"	3,288	84	97	"	"
Jan.	339	80	89	"	"	3,404	80	89	"	"
Feb.	396	98	105	"	"	3,743	98	105	"	"
Mar.	552	168	98	"	"	4,414	168	98	"	"
Apr.	645	137	99	"	"	5,787	137	99	"	"
May	1,534	176	100	"	"	12,403	176	100	"	"
June	1,804	120	102	"	"	14,666	120	102	"	"
July	655	45	102	"	"	16,136	45	102	"	"
Aug.	435	113	102	"	"	3,466	113	102	"	"
Sept.	402	109	100	"	"	2,979	109	100	"	"

<sup>a</sup>Reduction in river flow is the direct depletion for pumping alternatives and the summation of depletion, evaporation, and diversion to storage in the alternatives with storage.

<sup>b</sup>Based on period of record 1963-1978 to coincide with closure of Flaming Gorge Dam.

<sup>c</sup>Based on computer simulation by Utah Division of Water Resources.

TABLE 4-3

Worst Case Water Depletions and Shortage By Alternatives  
During Driest Period of Record

Month	Discharge- at Watson Gage (cfs)	White River				Discharge at Green River Utah (cfs)	Green River				White and/or Green Rivers			
		Reduction in River Flow <sup>a</sup> (cfs)					Reduction in River Flow <sup>a</sup> (cfs)				Shortage from Alternatives (cfs)			
		Alt. 1 <sup>b</sup>	Alt. 3	Alt. 4	Alt. 5		Alt. 1 <sup>b</sup>	Alt. 3	Alt. 4	Alt. 5	Alt. 1 <sup>b</sup>	Alt. 3	Alt. 4	Alt. 5
1976 June	1,203	125	102	0	97	11,051	125	102	97	97	0	0	0	0
July	364	[81] <sup>c</sup>	102	0	97	4,575	[81] <sup>c</sup>	102	97	97	0	0	0	0
Aug.	337	93	87	0	87	3,357	93	87	97	97	0	0	0	0
Sep.	287	35	37	0	37	3,109	35	37	97	97	0	0	0	0
Oct.	384	140	134	0	97	3,485	140	134	97	97	0	0	0	0
Nov.	345	92	95	0	95	3,684	92	95	97	97	0	0	0	0
Dec.	293	40	43	0	43	3,671	49	43	97	97	0	0	0	0
1977 Jan.	320	76	70	0	70	3,850	76	70	97	97	0	0	0	0
Feb.	349	79	99	0	97	3,592	79	99	97	97	0	0	0	0
Mar.	395	151	145	0	97	4,666	151	145	97	97	0	0	0	0
Apr.	412	160	162	0	97	4,474	160	162	97	97	0	0	0	0
May	384	140	113	0	97	5,650	140	113	97	97	0	0	0	0
June	264	12	14	0	14	4,410	12	14	97	97	0	0	0	0
July	140	[81]	0	0	0	2,978	[81]	0	97	97	0	0	0	0
Aug.	207	0	0	0	0	2,760	0	0	97	97	0	0	0	0
Sept.	212	0	0	0	0	2,358	0	0	97	97	0	0	0	0
Oct.	270	26	20	0	20	1,898	26	20	97	97	0	51	0	0
Nov.	311	59	61	0	61	1,951	59	61	97	97	0	36	0	0
Dec.	277	33	27	0	27	1,926	33	27	97	97	0	70	0	0
1978														
Jan.	299	55	49	0	49	2,049	55	49	97	97	0	48	0	0
Feb.	306	36	56	0	56	2,247	36	56	97	97	0	41	0	0
Mar.	457	213	207	0	97	4,035	213	207	97	97	0	0	0	0
Apr.	603	351	397	0	97	6,287	351	397	97	97	0	0	0	0
May	1,514	882	201	0	97	11,158	882	201	97	97	0	0	0	0
Jun	2,934	125	102	0	97	18,050	125	102	97	97	0	0	0	0

<sup>a</sup>Reduction in river flow is the direct depletion for pumping alternatives and the summation of depletion, evaporation, and diversion to storage in the alternatives with storage.

<sup>b</sup>Based on computer simulation by Utah Division of Water Resources, which includes the flow criteria from the FWS Biological Opinion.

<sup>c</sup>Brackets [ ], indicate flow augmented by amounts shown.

## CONSULTATION AND COORDINATION

years, depletions during most months in the Green River would be about 2 percent (Table 4-2), while in low flow years the depletions during all months would be from 1 to 3 percent (Table 4-3). These depletions would not affect downstream existing water rights.

Construction and operation of the dam would modify downstream channel morphology in the White River over a period of years. Because the dam would trap an estimated 94 percent of the sediment, releases would be nearly sediment-free during the initial 20 years of the dam's operation, and hence result in substantial scouring for a number of miles downstream (Clyde 1980).

A gradual degradation or loss of fine sediments in the riverbed would occur; thus, the rate of scour and reentrainment of sediment would decrease, resulting in armor plating. This process would eventually cause a decrease in sediment transport. The river channel would likely be narrower and deeper with possibly higher mean current velocity. However, the stream bottom morphology would have been modified considerably during the estimated 20 years before this equilibrium was attained. This impact would occur over the entire downstream extent of the river, but would lessen with increased distance below the dam (Clyde 1980). Land islands developed by the meandering stream would not be scoured by high water as experienced in the past.

Projections of downstream water quality as a result of the dam are subject to considerable variability. Retention time in the reservoir is estimated to be 11 to 14 days during runoff, 19 to 24 days as runoff receded, and 44 to 76 days during low flow periods. Much of the flow would move through the reservoir rather rapidly after it filled. During the annual turnover (thermal circulation of the entire body of water), there would be substantial increases in phosphorus content as oxygen-deficient water from the inactive storage area circulated and was released downstream. In addition, releases of hydrogen sulfide would also occur for a short time during the fall from similar sources (Lamarra 1980).

An analysis of projected water temperatures of the White River downstream of the dam was prepared by Grenney and Caupp (1980). Utilizing a simulation model (Grenney et al. 1980), water temperatures were predicted at several flow rates for various distances downstream of the dam, assuming a release temperature of 56F (13.3C). The conclusions of the analysis are:

1. The dam (based on current design) would result in generally lower maximum water temperatures than historical values for flows greater than 50 cfs (1.42 m<sup>3</sup>/sec.).
2. Depending on flow, 80 to 90 percent of the temperature increase over projected release

temperatures would occur within 15 miles (24 km) downstream of the dam (Grenney and Caupp 1980) and would not cause any change to present irrigators.

Sediment levels would be reduced considerably over present conditions due to the trap efficiency of the reservoir. Based on the methods of Hawkins (1980), outflow concentrations of suspended solids below the dam would be approximately 175 parts per million. As a result, the tailwater would be essentially clear most of the year. This would make water withdrawal in the lower White River for irrigation easier and less expensive, primarily because equipment (pumps) would last longer and breakdowns would be reduced. The clearer flows could stimulate additional agricultural development in the lower White River, which would ultimately increase the water depleted from the river.

Depletions at the level indicated in Table 4-2 would cause an estimated increase of 4.1 milligrams per liter (mg/l) in Colorado River salinity at Imperial Dam, California. Annual costs of salinity increases are estimated to be \$450,000 per mg/l increase at Imperial Dam (USDl, Bureau of Reclamation 1981a).

### Mitigation

The Utah Division of Water Resources has redesigned the outlet works to release water at various temperatures to facilitate a fish and wildlife management plan to be developed by BLM, FWS, Utah Division of Wildlife Resources (UDWR), and Utah Division of Water Resources for the White River (see Figure 2-8).

### Unavoidable Adverse Impacts

The White and Green Rivers would be depleted by a total of 80,500 acre-feet per year. The channel of the White River below the dam would be armored as fine sediments would be scoured out of the streambed. Water clarity would increase. Salinity would increase at Imperial Dam, California by 4.1 mg/l.

Increases in hydrogen sulfide for a short period during the fall and increases in phosphorus content could adversely affect water quality below the dam.

## THE PROPOSED RESERVOIR

### Anticipated Impacts

It is anticipated the reservoir would be eutrophic (highly productive biologically and oxygen consumptive) in nature (Lamarra 1980). Turbidity levels could limit light availability, hence algal production. In addition, preliminary analyses indicate that nutrient levels would be nitrogen limited. The reservoir would, therefore, be expected to be one in which high demands for oxygen would exist, but where primary production

## ENVIRONMENTAL CONSEQUENCES

could be limited by light and nutrients. As previously discussed, increases in hydrogen sulfide (for a short period during the fall) and phosphorus content could affect water quality in the reservoir.

A deep body of water in an area of extreme seasonal climatic variations such as the reservoir would thermally stratify into distinct layers during the summer months. This stratification is important because it controls the water temperature at various water depths in the reservoir, the timing and rate of mixing of the entire body of water, and the oxygen concentration within the reservoir. Figure 4-2, taken from Lamarra (1980), compares thermal stratification of the proposed reservoir as determined by Utah Division of Water Resources (1980b) and that of Deer Creek Reservoir in Wasatch County, Utah.

Thermal stratification processes are expected to result in severe oxygen depletions in the deeper portions of the reservoir for periods of at least 100 days each year, frequently becoming anoxic (totally depleted of oxygen) (Lamarra 1980). This characteristic would have a detrimental impact upon any potential cold water reservoir fishery, since fish would not be able to survive in the cold water zone.

An additional concern relative to the reservoir is the potential for contamination of the water due to contact with oil shale outcroppings. Oil shale leachate is a complex waste including trace elements, salts, heavy metals, and organic compounds. Cleave et al. (1979) found that the ion composition and pH of oil shale leachate is dependent upon the contact time of the water with the oil shale. Leaching tests by Colorado State University (1971) indicated a definite potential for high salt concentrations in runoff from spent oil shale residues. In addition, certain organic substances present in processed oil shale are suspected of being carcinogenic hazards. Studies by Maase and Adams (1980) regarding the presence of certain of these compounds and their movement from processed oil shale indicated that a potential does exist for their entry into the runoff process.

However, as indicated above, the majority of available research has been conducted on spent or processed oil shale residues. In summary, it is assumed that in situ deposits would not be subject to the same levels of extensive leaching, and the potential for adverse chemical impacts would therefore be substantially less.

Because preliminary investigations of the sedimentation characteristics of the proposed reservoir indicated a potential for higher levels of sediment accumulation and turbidity than suggested in the original Utah Division of Water Resources (1980c) action plan, more detailed analyses of the process were developed. After reviewing previous estimates of sediment yield on the White River relative to this project

and discussions by an interagency group convened to consider approaches to the problem, Grenney and Kraszewski (1980) developed an estimate utilizing the flow-duration, sediment rating curve technique (USDI, Bureau of Reclamation 1951). In a separate report, Hawkins (1980) addressed sediment trapping, bulk density, and turbidity in the reservoir.

Although limited by the lack of readily available data, (i.e., recent and complete flow-duration curves for the three major flow regimes of the White River near Watson), Grenney and Kraszewski (1980) arrived at an estimated total sediment load of 2.2 million tons per year. This figure was derived by applying the techniques and assumptions agreed upon by the interagency group during its discussions and is considered state-of-the-art with regard to approach and data availability.

The analysis prepared by Hawkins (1980) takes a convenient value for sediment yield (3 million tons/year) and proceeds through a series of calculations to evaluate various levels of trap efficiency and sediment bulk density. Information is provided to evaluate these factors under any given level of sediment yield. The interagency group decided to assume a trap efficiency of 94 percent and a density of 75 lb/ft<sup>3</sup> for the reservoir.

Utilizing the method of Hawkins (1980) and the above assumptions, 1,273 acre-feet of sediment would be deposited in the reservoir each year. Most of this sediment (1,151 acre-feet/year) is suspended, which includes the finer particles. A smaller portion (122 acre-feet/year) is bedload, primarily sand and larger rock particles. Using these figures, the probable life of the proposed reservoir's inactive storage (38,550 acre-feet) would be 33 years and the entire reservoir (109,250 acre-feet) would fill with sediment in 86 years. Thus, the 1,980 acres in the inundation area would be covered by a maximum depth of 127 feet of sediment.

Of course, any additional upstream depletion on the main stem White River would substantially reduce sediment load in the White River Reservoir and lengthen its life accordingly. The uncertainty of construction of main stem dams in Colorado, including their location and size, prohibits quantification of these changes in the life of the White River Reservoir at this time.

In an evaluation of the reservoir's capability to provide the necessary quantities of water (75,000 acre feet/year or 104 cfs) over the long term, reservoir storage requirements to satisfy needs during the "worst-case" situation of June 1976 to June 1978 were analyzed. The following assumptions were used in the analysis:

1. No storage water was released when natural flows exceeded 354 (250 plus 104) cfs from August 1 to June 14, or when flows exceeded 604 (500 plus

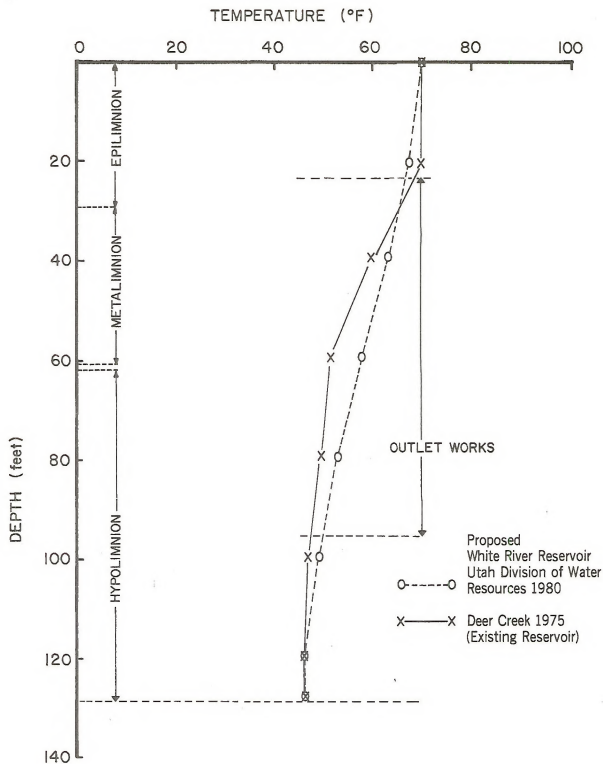


Figure 4-2  
PREDICTED THERMAL STRATIFICATION OF THE PROPOSED RESERVOIR, AND THE MID JUNE, 1975, PROFILE  
OF DEER CREEK RESERVOIR IN UTAH

## ENVIRONMENTAL CONSEQUENCES

104) cfs, 479 cfs, and 354 (250 plus 104) cfs from June 15 to July 31 (see wet, normal, dry, or critically dry flow criteria in Appendix 3). The entire 104 cfs was needed from storage when flows were lower than 250 cfs from August 1 to June 14, or 500 cfs, 375 cfs, and 250 cfs from June 15 to July 31.

2. Storage water was needed when flows were below those mentioned above.

3. When flows were lower than those mentioned above, the natural flow of the river plus augmentation from the 5,000 acre-feet as described in Appendix 3 were released downstream.

Using the above assumptions and the 1976-1978 flow data, the proposed White River Dam would have had to supply 68,500 acre-feet of storage in 1976-1978 to meet the total need of 75,000 acre-feet. Using the sedimentation characteristics of the reservoir discussed above (1,273 acre-feet of sediment per year), after 36 years the White River Dam would be sufficiently filled with sediment such that it supplied 68,500 acre-feet of storage. Thus, after 36 years, the reservoir could not supply sufficient storage for the "worst-case" situation. Once again, upstream dams on the main White River in Colorado would increase the useful life of the White River Dam Project.

### Mitigation

The need for mitigation of potential water quality problems associated with the inundation of oil shale, if any, would be identified by the Utah Division of Water Resources. This agency, in consultation with State and Federal regulatory agencies, would establish an organic carbon monitoring program to sample and evaluate water quality at several points in the reservoir. If problems developed, appropriate action would be determined by the Utah Division of Water Resources, the Utah Division of Health, and the Environmental Protection Agency (EPA).

The impacts of sedimentation on the environment could not be mitigated.

### Unavoidable Adverse Impacts

Water in the reservoir would be thermally stratified, and the deeper cold water zones would be oxygen deficient. Increases in hydrogen sulfide (for a short period during the fall) and increases in phosphorus content could affect water quality in the reservoir. The reservoir would fill with sediment and could not store 68,500 acre-feet after 36 years.

## GROUNDWATER

### Anticipated Impacts

The potential would exist for increased groundwater recharge as a result of the proposed overlying reser-

voir. About 0.9 cfs of White River water would flow into the Bird's Nest Aquifer. In those areas where increased recharge occurred, groundwater quality could improve slightly in response to dilution with higher quality surface water (Phillips 1980).

### Mitigation

None.

### Unavoidable Adverse Impacts

None.

## WETLANDS AND FLOODPLAINS

### Anticipated Impacts

The construction of the dam and filling of the reservoir would inundate approximately 995 acres (403 ha) of riparian floodplain outside the river channel. An additional 4,575 acres (1,851 ha) of riparian floodplain would be altered between the dam and the confluence with the Green River by the decrease in high flows and the stream channel armoring. These processes would cause less area to be flooded, therefore decreasing the size of the active floodplain. Islands which presently are flooded during some spring runoffs would no longer be inundated. This riparian area is of substantial ecological value and is protected under Presidential Executive Orders 11988 (1978) and 11990 (1978) concerning floodplain management and protection of wetlands, respectively. As sedimentation occurred in the reservoir, the upper reaches would gradually silt in first and convert to a marshland-type habitat. This would partially negate the impacts to the riparian floodplain.

The 115 acres (47 ha) of wetlands near the mouth of the White River would not be affected by this project, as they are primarily sustained by irrigation return flows.

### Mitigation

The loss of the existing river riparian vegetation condition would not be replaced in kind; however, it would be mitigated to the extent feasible by improvement of an existing marshland and riparian habitat in accordance with a wildlife mitigation plan by BLM, FWS, UDWR, and Utah Division of Water Resources.

### Unavoidable Adverse Impacts

Approximately 995 acres (403 ha) of riparian floodplain would be inundated by construction of the dam and reservoir; this represents approximately 16 percent of the total White River riparian floodplain in Utah. Another 4,575 acres (1,851 ha) below the dam would be somewhat affected by decreased flows and armor-

## ENVIRONMENTAL CONSEQUENCES

ing, causing an unquantifiable decrease in the quality of riparian habitat.

### Vegetation

#### ANTICIPATED IMPACTS

Plant productivity, cover, and density data for the different vegetation types (Allan 1979, VTN Colorado, Inc. 1977) provide a basis for predicting the effects of the proposed developments on the vegetation in the project area. Riparian areas which presently or could potentially support broadleaf vegetation (i.e., cottonwoods and others) in semi-arid ecosystems are of special management concern.

The acreages of vegetation types which could be disturbed or eliminated by the proposed project are listed in Chapter 3, Table 3-5. The removal of vegetation in the fluctuation zone prior to filling the reservoir would create a 46-foot-high (14 m) denuded area around the perimeter of the reservoir just below the proposed shoreline elevation. The primary concern associated with construction activities would be the possibility of erosion on steeper slopes which could affect plant communities by silting-in or unearthing plants near developing water channels.

An estimated 995 acres (403 ha) of riparian and 547 acres (221 ha) of upland (sagebrush-greasewood and shadscale) vegetation would be inundated by the reservoir at the normal water surface elevation. The potential loss of plant productivity and cover resulting from disturbance and inundation is expected to be of local importance to wildlife and livestock, especially in the riparian vegetation type.

In general, an average fluctuation of 5.5 vertical feet (1.7 m) in reservoir depth under normal conditions would not have much impact on the vegetation immediately surrounding the reservoir. A drop of 5.5 feet in reservoir depth would expose approximately 28 acres (11 ha) of previously inundated riparian land at the upper end of the reservoir and, over an extended period of time, riparian vegetation would encroach on the exposed area. This newly formed riparian vegetation would again be inundated as the reservoir level rose to its normal maximum height.

No riparian vegetation establishment would be expected along the shorelines in the sagebrush-greasewood and shadscale types due to the relatively steep slopes and the low water-holding capacity of the shallow soils. However, plant species common to these two upland vegetation types could become established in scattered locations such as side canyon draws.

Fluctuations in discharge rates from the dam, above or below the seasonal average flows, could have an effect on riparian vegetation along the White River

from the dam site downstream to the confluence with the Green River. Cottonwood trees, for instance, require flooding for the seedlings to germinate. Reduction in flows below the dam during spring runoff would decrease the magnitude and frequency of the flooding, thereby reducing the potential for cottonwood germination. This decrease would create an unquantifiable reduction in cottonwoods along the White River. In addition, construction of the dam would accelerate the growth and establishment of salt cedar (tamarisk) downstream from the dam, perhaps to the exclusion of native cottonwoods and willows. Maintenance of the anticipated minimum release of water over 5-10 years could lead to an encroachment of riparian vegetation toward the center of the river channel. In addition, an occasional decrease of high flow levels would reduce the number of sandbars presently inundated annually. Therefore, an unquantifiable change of downstream riparian vegetation would occur, potentially affecting up to 4,575 acres (1,851 ha) of riparian vegetation.

Approximately 882 acres (357 ha) of sagebrush-greasewood and shadscale vegetation would be destroyed by the removal of dam embankment materials from potential off-site borrow material areas. Even though relatively large acreages of vegetation would be affected, the impact is expected to be of low significance due to the condition and abundance of these vegetation types in the White River project area.

Improvement and realignment of access roads from Wagon Hound Canyon to the White River Dam (Alternatives A and B) (Figure 2-12) would eliminate small acreages (see Table 3-5) of vegetation, primarily upland types. This impact would be of low significance.

The proposed transmission line extending from the hydroelectric plant to the Bonanza Power Plant near Bonanza would disturb approximately 77 acres (31 ha) of vegetation. All four vegetation types would be disturbed by the transmission line route, but the impacts would be restricted to a narrow corridor and would be of minor significance. Vegetation on 3,117 acres (1,261 ha) would be disturbed or occupied by the dam and spillway, reservoir, access roads, transmission line, recreation sites, and material sites. This is composed of 995 acres (403 ha) of riparian vegetation and 2,122 acres (859 ha) (including the river channel) of upland vegetation.

#### MITIGATION

A vegetation clearing plan would be developed to address site-specific needs. Clearing would be restricted as required by the appropriate land management agency. This would be effective in reducing the amount of clearing and should reduce the adverse impacts.

After removal of embankment materials, borrow

## ENVIRONMENTAL CONSEQUENCES

areas would be shaped to drain and blend in with the surrounding landscape. The auxiliary spillway areas would also be shaped and blended into the surrounding topography. All disturbed areas plus power line corridors, temporary construction roads, and similar areas would be revegetated to reduce the potential erosion hazard and restore natural aesthetic quality.

A permanent long-term revegetation program would be used for the White River Dam Project. It would primarily involve the seeding and/or transplanting of native-type plant species adapted to the environmental conditions of the project area. Because of limited precipitation, steep slopes, and shallow soils, revegetation of borrow material Sites 1 and 2 could be difficult. Reclamation would require removal, stockpiling, and replacement of topsoil; seed bed preparation; fertilization; and mulching.

The disturbed areas which would not be occupied by project features would be revegetated in the above manner. Revegetation methods and adapted native species for the proposed project area are described by the Institute for Land Rehabilitation (1979a, 1979b) and are summarized in Appendix 9 of this EIS.

Normally, flooding from large reservoir spills (i.e., during high spring river flows) would partially mitigate impacts to riparian vegetation downstream from the dam.

The loss of the existing river riparian vegetation condition would not be replaced in kind; however, it would be mitigated to the extent feasible by improvement of an existing marshland and riparian habitat in accordance with a wildlife mitigation plan developed by BLM, FWS, UDWR, and Utah Division of Water Resources.

### UNAVOIDABLE ADVERSE IMPACTS

About 995 acres (403 ha) of riparian vegetation and 547 acres (221 ha) of upland vegetation would be occupied by the dam and reservoir. Additional acreages of upland vegetation would be occupied by access roads, a transmission line, and recreation sites. An unquantifiable amount of additional upland vegetation would be temporarily disturbed. Even with the aid of revegetation programs, these temporarily disturbed areas could take several years (up to 20 years depending on site conditions) to return to a productivity, cover, and composition similar to that of surrounding undisturbed areas.

An unquantifiable amount of riparian-floodplain vegetation would be modified along the White River below the proposed dam on 4,575 acres (1,851 ha). Removal of large acreages of riparian vegetation would have the greatest local impact since it is the most productive and ecologically important vegetation type. With the exception of the effect of extended low discharge rates from the White River Dam on down-

stream riparian vegetation, the majority of the proposed construction and operation activities would not seriously affect the plant communities beyond the construction and inundation zones.

### THREATENED, ENDANGERED, AND SENSITIVE PLANT SPECIES

#### Anticipated Impacts

A population of *Penstemon albifluvis* would be inundated by the reservoir. Another site in the Evacuation Creek area supports this rare species. It is not fully known what the distribution of this plant is within its natural setting. This species could be rather restricted in range and abundance and is a candidate species for listing as endangered or threatened (category 1).

#### Mitigation

A thorough review of the population's distribution and abundance would be made to ascertain its status before construction began. Intensive on-the-ground surveys of the borrow material sites would be necessary before issuance of any approvals for removal of borrow materials. BLM, FWS, and Utah Division of Water Resources would develop a conservation plan for the loss of *Penstemon albifluvis* that would be inundated or destroyed by surface disturbance. However, a memorandum of understanding between FWS and BLM to carry out the transplant work and other mitigation measures would be signed before right-of-way permits would be issued.

### Unavoidable Adverse Impacts

One population of *Penstemon albifluvis*, a sensitive species, would be inundated or destroyed; however, it is the FWS' opinion that, with a properly implemented memorandum of understanding, the continued survival of the White River *Penstemon* would be insured.

### Terrestrial Wildlife

#### MAMMALS

#### Anticipated Impacts

The White River Dam would eliminate habitat for the mammals presently utilizing the reservoir basin. Table 4-4 quantifies the numbers of several selected common species of game and nongame mammals that would be displaced from the 995 acres (403 ha) of riparian habitat.

The reservoir would eliminate 13.5 river miles (22 km) of habitat for the estimated 176 beaver currently located in the river bottoms and would lower their numbers downstream. Lack of annual flooding would reduce cottonwood germination downstream from the

TABLE 4-4

Expected Losses or Displacements of Selected  
Mammals Due to Flooding of 995 Acres of  
Riparian Habitat on the White River

	Average Number of Resident Individuals
Beaver	176 <sup>a</sup>
Deer Mice	25,000
Woodrats	3,200
Porcupines	26
Cottontails	189
Mule Deer	200

Source: Grant et al. 1980.

<sup>a</sup>Source: Cranney 1980.

## ENVIRONMENTAL CONSEQUENCES

dam. This would lead to decreased food availability from the dam to the Green River and decrease the beaver population in that area.

Most small rodents prefer upland areas to riparian, and greater densities are usually found in upland areas (Grant et al. 1980). Deer mice and bushy-tailed woodrats (packrats) are the major exceptions. These species prefer the riparian area or adjacent uplands and are most dense in these areas. When riparian habitats supported 10 deer mice/acre in 1977, desert shrub supported 1 mouse/acre and the juniper supported none (Grant et al. 1980). The upland rodent populations fluctuate directly with spring precipitation and subsequent primary production of annual plants (Beedlow et al. 1980). The permanent water in the river buffers the riparian populations from the precipitation dependence. Therefore, the loss of 13.5 river miles (22 km) of riparian habitat would reduce the population of deer mice and bushy-tailed woodrats as well as the habitat buffer used by other species during drought. This loss of rodent production is important since it is an important component in the area's food chain.

Another rodent is the porcupine whose primary food resource is cottonwood. Most of the resident porcupine population would be displaced from the reservoir basin and would emigrate to other areas. Thus, there would be no significant impact to this species.

Unquantifiable but insignificant numbers of omnivorous or carnivorous and/or fur-bearing animals would be affected. These animals are coyote, gray fox, ring-tail, raccoon, badger, striped skunk, and bobcat. These species would lose both den sites and food resources (rodents). The bobcat and badger are protected under Utah State law.

Two game mammals in the riparian habitat, the desert cottontail and the mule deer, would be affected by the reservoir.

During 1975-1979 cottontail abundance in the riparian habitat was not significantly different from that in upland areas. However, when cottontail populations decline following years of low vegetation production, abundance in the riparian areas declines less sharply. This phenomenon indicates that the riparian areas act as a buffer for the populations, perhaps providing an important population pool for upland areas and stimulating recovery following poor years. Estimated direct losses in cottontail populations from the flooding of the riparian zone are shown in Table 4-4.

Cottontails are an important food source for coyotes and large raptors. The loss of this food source could reduce the local carnivore population. Cottontails are also considered a game animal.

Loss of 13.5 river miles (22 km) in the reservoir area of the riparian system would reduce the yearly deer-

fawn production of the vicinity by 68 fawns per year (VTN Colorado, Inc. 1977). The population of the deer herd which uses the riparian habitat in the project area is estimated at 200. The riparian area is the only suitable habitat available for their use.

As the reservoir filled, deer would be pushed out of the flooded areas into adjacent upland and upstream riparian areas. This deer use would exceed the habitat's carrying capacity for 2 to 4 years, after which deer numbers would decline, reflecting the capacities of the habitat.

Additional deer losses would occur in surrounding areas which presently rely on the White River riparian area for fawn production. Access road Alternative B would disturb a deer wintering area (Figure 3-7). This wintering area would be used by deer during the construction phase of the project.

Excavation at borrow material Site 2 could disrupt antelope reproduction during the critical fawning season (May 10 through June 20) and could reduce the herd because of fawn abandonment. The long-term effects of borrow material site revegetation would be beneficial to antelope because of additional forage.

The effects of the proposed White River Dam on terrestrial wildlife are summarized in Figure 4-3.

### Mitigation

Mitigation would require reestablishment or improvement of an equal area of riparian habitat, which may be only partially attainable on other lands in the region.

Construction to the north of the river (i.e., transmission lines and borrow material excavation, Site 2) would not begin during the critical antelope fawning season (May 10 to June 20).

The FWS has submitted its Fish and Wildlife Coordination Act Technical Assistance Report, included as Appendix 10 of this EIS. This report contains recommendations for reducing impacts to deer and other wildlife species. A wildlife mitigation plan for all project facilities would be developed jointly by the BLM, FWS, UDWR, and Utah Division of Water Resources to implement feasible mitigation measures.

### Unavoidable Adverse Impacts

Without mitigation, the loss of 995 acres (403 ha) of riparian habitat would result in the loss of up to: 176 beaver; 25,000 deer mice; 3,200 bushy-tailed woodrats; 26 porcupines; 189 cottontails; and 200 deer. Unquantified additional losses to these species would occur in the riparian area along the White River below the dam. Additional unquantified deer losses would occur in surrounding areas where deer rely on the White River riparian area for fawn production.

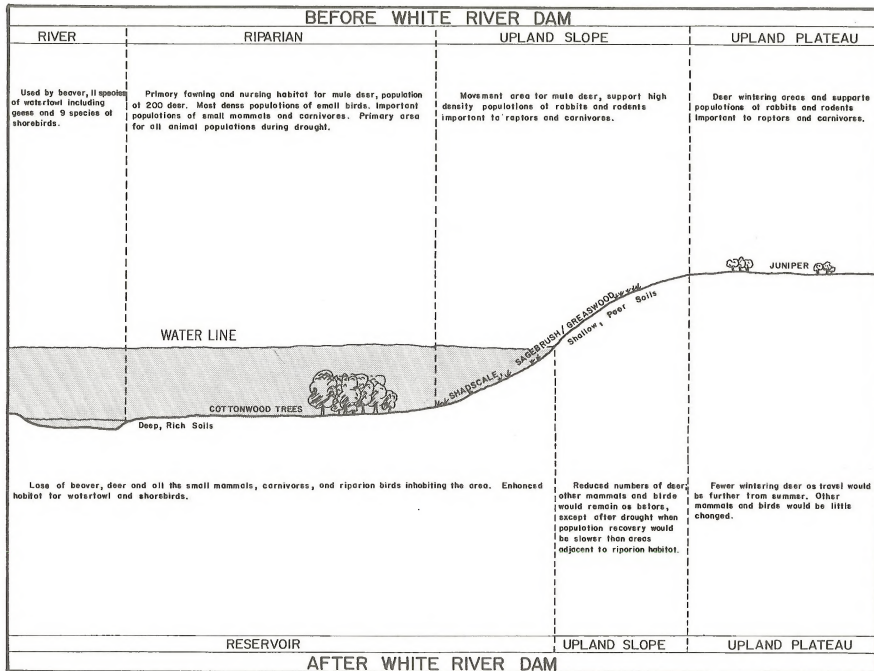


Figure 4-3  
 CONCEPTUALIZATION OF THE EFFECT OF THE WHITE RIVER DAM ON THE TERRESTRIAL ECOSYSTEM  
 OF THE WHITE RIVER

## ENVIRONMENTAL CONSEQUENCES

However, mitigation measures in the wildlife mitigation plan would be a principle objective to reduce unavoidable adverse impacts, especially for deer.

### BIRDS

#### Anticipated Impacts

As a group, raptors and other nongame birds would suffer the greatest losses from flooding 995 acres (403 ha) of riparian habitat. Of the 126 species which inhabit the riparian system, 90 species would be either displaced or have reduced populations; 27 species would not be affected; and 6 species would increase in number. An estimated 21 new species would use the reservoir, primarily shorebirds and waterfowl. Loss of the riparian habitat would be more critical to birds than loss of other habitat types. In an average year in which about 600 birds would be affected in a comparable amount of juniper habitat and 800 affected in a comparable amount of sagebrush-greasewood, 2,200 birds would be affected in the riparian habitat. In times of peak abundance, these figures are approximately 1,400, 1,900, and 5,000, respectively. The loss of these birds would be important because they are an integral part of the riparian ecosystem.

Alternative 1 would adversely affect raptors by eliminating prey base for 14 species that hunt in the riparian habitat. Eight of the species also nest in the area. Shelter and roosts for these raptors would also be lost. Those nesting species primarily impacted for the long term would be long-eared owls, great horned owls, osprey, screech owls, and Cooper's hawks. A red-tailed hawk nest would be affected during construction but no long-term effects would be expected since the next site is located above the reservoir level.

The most serious adverse impact to raptors would be the loss of prey base during drought conditions. During the 1977 drought, when upland prey base was at low density, the riparian habitat became the prime area for the raptors' food resource. Prey production near the reservoir shores would not equal production from the current riparian habitat.

The transmission lines could electrocute raptors which use the poles for roosting.

The reservoir would impact the Canada goose by eliminating nesting habitat for 13.5 river miles (22 km) in the reservoir basin and by eliminating or reducing nesting habitat for 50 miles (80 km) to the White River's confluence with the Green River.

Surveys by the UDWR indicate that 6 nesting pairs of geese (averaging 6 young per brood for a total of 48 geese) use the reservoir basin. Another 7 nesting pairs (a total of 56 geese) use the White River below the proposed dam (Drobnick 1980b). Additional non-nesting adult geese also utilize these areas. There-

fore, habitat for 6 nesting pairs and an annual production of 36 young geese would be lost from the reservoir basin and habitat for 7 nesting pairs with an annual production of 42 goslings would be reduced below the dam. An unquantifiable number of nonnesting adults would also lose summer habitat.

Game birds that would be enhanced by the reservoir are migrant waterfowl and snipe. The reservoir, based on expected turbidity and lack of emergent vegetation, would support nesting waterfowl only in the tailwaters. Therefore, there would be little nesting in the project area.

#### Mitigation

All power transmission lines associated with the proposed White River Dam would be designed and constructed to prevent electrocution of raptors.

The Wildlife Mitigation Plan would include mitigation for birds. Appendix 10 of this EIS contains recommendations for mitigating impacts to geese and other birds.

#### Unavoidable Adverse Impacts

Approximately 90 species of nongame birds would be displaced or have reduced populations due to loss of the riparian habitat. Raptors would also be reduced in the project area due to loss of riparian and nesting habitat and loss of prey species, especially during and immediately after droughts. Loss of Canada goose nesting habitat in the reservoir basin would result in the loss of a yearly production of 36 geese. Losses of goose nesting habitat could occur downstream for 50 miles (80 km), affecting an annual production of 42 geese. Additional small but unquantifiable goose losses would be attributable to the loss of nonnesting goose habitat in the reservoir basin and below the reservoir. The Wildlife Mitigation Plan would be designed to offset loss of goose habitat.

#### Threatened, Endangered, and Sensitive Bird Species

##### ANTICIPATED IMPACTS

The whooping crane and peregrine falcon are transient to the area. Bald eagles winter in the area. The reservoir and tailwaters which would be ice-free for a considerable distance below the dam could enhance the wintering eagles' habitat and offset the loss of winter roosting in the reservoir area. Appendix 10, FWS Technical Assistance Report, and Appendix 4, FWS Biological Opinion, contain more detailed information.

## ENVIRONMENTAL CONSEQUENCES

### MITIGATION

See the FWS Biological Opinion for conservation measures recommended for bald eagles.

### UNAVOIDABLE ADVERSE IMPACTS

None.

## Aquatic Wildlife

### WHITE RIVER

#### Anticipated Impacts

The White River Dam and Reservoir would impact the aquatic ecosystem in three general areas: upstream from the reservoir, within the reservoir basin, and below the dam.

The major impacts above the reservoir basin would involve the potential upstream movement of warm water fishes from the reservoir. It is doubtful that any of the fish that could be planted as game species (i.e., largemouth bass and bluegill) would utilize the White River because they are lake or pond species and have been in the Colorado system for many years without becoming abundant (Holden and Stalnaker 1975).

The green sunfish, already in the White River, would probably become more abundant and could create additional competition and predation for native species, including the Colorado squawfish, in the river 20 to 30 miles (32 to 48 km) above the reservoir. This phenomenon occurred in the Colorado River where ponded areas along the river are common (Holden and Stalnaker 1975; Kidd 1977).

As evidenced by past exotic introductions, most of the eight introduced species in the White River are not abundant except for red shiners and fathead minnows. Furthermore, the number of warm water species that have been introduced into the Upper Colorado River system totals near 20. Only 5 or 6 of these have reproduced well and became abundant in the upper basin (Holden and Stalnaker 1975). Therefore, there is a low probability that introduced fish would change the species composition in the White River above the reservoir with the exception of the green sunfish. The river ecosystem above the reservoir would still be reliant on terrestrial detritus for the initial energy input, and invertebrates would still occur in relatively small numbers.

The reservoir area of about 13.5 river miles (22 km) in length would be changed by the proposed project. The native riverine fauna would be replaced by exotic lake-pond species. This would have a positive impact from a fishery standpoint. A warm water fishery, probably bass and/or panfish, could be established in the reservoir and would probably be of low quality. The

high turbidity and other problems noted in the Water section would probably limit the fish productivity of the reservoir. The primary producers would be phytoplankton (algae) which would grow and live in the open water of the reservoir. They would be fed on by zooplankton, also open-water inhabitants. Lamarra (1980) indicated the lower, cooler zones of the reservoir would be lacking in oxygen, especially in late summer and early fall. Also, poisonous gases (hydrogen sulfide) could accumulate near the bottom. This factor could eliminate the possibility of a cold water (trout) fishery in the reservoir.

The native aquatic ecosystem below the dam (50 miles) would also be altered. However, with the currently proposed dam outlet works, it is expected that temperatures would warm sufficiently to permit a partial native community to remain established in the White River below the dam by the retention of most native fishes. According to the FWS official Biological Opinion, the White River below the dam would not be managed as a cold-water fishery. Figure 4-4 illustrates the before and after effects of the White River Dam on the White River aquatic ecosystem.

### Mitigation

Fishery management agencies have agreed that existing downstream temperatures would be maintained. The effects of cold water releases below the dam would be partially mitigated by raising the depth of the intake structure gates to a level where summer temperatures were near 66.5° F (19.2° C). An increase in release temperatures would not totally reestablish the native ecosystem and thus would only partially mitigate the loss.

### Unavoidable Adverse Impacts

The native aquatic ecosystem would be lost in the 13.5 river miles (22 km) of the reservoir and altered in the 50 miles (80 km) below the dam. The White River below the dam would maintain a partial native system, primarily native fishes.

### Threatened, Endangered, and Sensitive Fish Species in the White River

#### ANTICIPATED IMPACTS

The proposed White River Dam would negatively impact the Colorado squawfish in the White River by blocking potential movements up the river and by changing water quality parameters in the lower river to the extent that squawfish would not utilize the area as at present. The dam would create an effective barrier to upstream and downstream movement. Colorado squawfish have been found above the dam site, indicating that they utilize the proposed reservoir basin for at least movement. The dam would effectively cut off access to nearly half of the White River presently

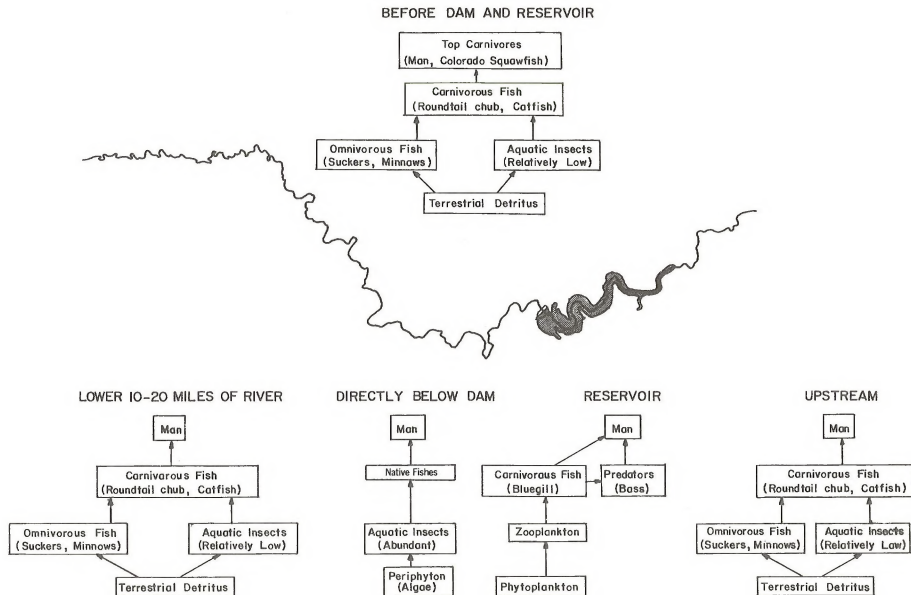


Figure 4-4

CONCEPTUALIZATION OF THE EFFECT OF THE WHITE RIVER DAM ON THE AQUATIC ECOSYSTEM OF THE WHITE RIVER

## ENVIRONMENTAL CONSEQUENCES

being used by this species. However, efforts to continue the species upstream from the dam would be carried out according to the conservation measures listed in the FWS Biological Opinion.

The importance of the White River or other tributary streams to Colorado squawfish is not fully known. At present the White is one of only three tributary streams in the Upper Colorado Basin still used to some extent by this endangered species. The other two are the Yampa and Duchesne Rivers, also tributaries of the Green River. The flows of the Duchesne River will be depleted by completion of the Central Utah Project, presently under construction (USDI 1979), which could make it less suitable for squawfish. This means any reduced use of the White River could reduce the number of tributaries remaining to the Colorado squawfish throughout the entire Colorado River system to one, the Yampa River. Since squawfish use these tributaries, and until contrary information is gathered, the White River must be considered important to this endangered species. However, it is the opinion of the FWS that, if the dam operation procedures and conservation measures described in the Biological Opinion were implemented, the continued existence of the Colorado squawfish would not likely be jeopardized.

Since only one specimen of both the humpback and bonytail chubs has been found in the White River (see Chapter 3), impacts to these species would probably be minor. No impacts on razorback suckers are expected in the White River because of low use by this species.

### **MITIGATION**

The impacts to the Colorado squawfish caused by blockage of the channel and change in water quality in the White River aquatic ecosystem would be avoided with implementation of the dam operating procedures and conservation measures described in the FWS Biological Opinion.

### **UNAVOIDABLE ADVERSE IMPACTS**

None.

## **GREEN RIVER**

### **Anticipated Impacts**

The White River Dam and Reservoir would impact the aquatic ecosystem of the Green River by reducing flows below the mouth of the White River and by decreasing temperatures slightly. It is doubtful these actions would change the aquatic ecosystem significantly. The Green would remain turbid and periphyton and aquatic invertebrates would remain in low abundance. The fish population would be the most affected.

Flow reduction could change the available habitat in the Green River to favor exotic species more than native species. It is doubtful the small depletion in flow from the White River Dam alone would create detectable changes.

The slight reduction in temperature which would be created by the dam in the White River would probably not be measurable once the White River water was mixed with the larger Green River.

### **Mitigation**

None.

### **Unavoidable Adverse Impacts**

The proposed White River Dam by itself would not significantly affect the aquatic ecosystem of the Green River; however, it would contribute to the cumulative adverse effects caused by all projects in the region by reducing flows.

### **Threatened, Endangered, and Sensitive Fish Species in the Green River**

#### **ANTICIPATED IMPACTS**

The major impact of the White River Dam on the Green River would be the contribution to the cumulative loss of flow. A number of studies have shown that loss of flow has negatively impacted the Colorado squawfish and bonytail chub. The bonytail has been the most seriously affected by flow depletions. Vanicek, Kramer, and Franklin (1970) found nearly 100 bonytails in the Green River below Flaming Gorge following closure of the dam. All of these fish were adults from year classes prior to dam closure. Holden and Stalnaker (1975) sampled the same area after Vanicek's study and found only 36 adult bonytails. Holden and Stalnaker (1975) searched collections of several hundred juvenile chubs collected in 1964-1966 and 1968-1971, but found only 3 possible bonytails. He concluded that bonytail chub population size and reproduction had decreased dramatically in the Upper Green River following closure of Flaming Gorge Dam.

These data from the Upper Green River, in conjunction with information from throughout the Upper Colorado Basin showing the rarity of this species, indicate that bonytail chubs have been seriously impacted by the major dam construction of the 1960s. The most likely factor causing the decline is reduced flows because water quality and temperature patterns appear to be acceptable to other native species in areas removed from direct impacts of the dams (Holden 1980). Any further flow reduction in the Green River could lessen the chance that this species would survive (Holden 1980). This species is already the rarest na-

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tive species in the Upper Colorado Basin and may well be on the verge of extinction.

Flows in the Green River have also been shown to be very important for the survival of Colorado squawfish (Holden 1980). Squawfish did not reproduce well in 1977, a drought year, in the Upper Green River. They did reproduce in 1975, 1976, 1978, and 1979, which were more normal flow years.

Squawfish do not appear to be as successful in reproducing in the Colorado River of Colorado and Utah as they are in the Green River of Utah (Holden and Stalnaker 1975, Kidd 1977). Joseph et al. (1978) indicated that May flows in the Colorado River have been depleted below historic low levels since the early 1960s, whereas flows of the Green River have not been depleted below historic low levels. Both areas contain many dams. However, the Green River still has the Yampa and White Rivers as free-flowing tributaries in addition to releases from Flaming Gorge Reservoir; therefore, the Green still retains a more natural flow level. It is not known how much additional depletion can occur on the Green River before Colorado squawfish reproductive success declines.

Sufficient data is not available to assess the impact of the project on humpback chub or razorback sucker, because it is not known if these species suffer from flow depletion. Data is available that indicate they have been eliminated below dams releasing cold water (Vanicek, Kramer, and Franklin 1970). Recent collections by the FWS in the Colorado River above Grand Junction have located a population of humpback chubs (Valdez 1980). This area, which is above the mouth of the Gunnison River, a major tributary, experienced flow depletions starting in the late 1800s. This population of humpback chubs needs further examination but its existence indicates that, if appropriate habitat is maintained, this species is not seriously affected by some levels of flow depletion. This also suggests that the humpback chub can tolerate greater flow depletions than the bonytail or Colorado squawfish, at least in some areas.

The lack of obvious reproduction for the razorback sucker may be a result of flow depletions since the 1960s. The razorback sucker is a long-lived fish, reaching at least 25 to 30 years in some areas (Mincley 1973). This may mean that the adults presently being captured in the Green River were all spawned before Flaming Gorge Dam was completed, and that no reproduction has occurred since before 1962. This hypothesis cannot be proven or disproven with available data.

The White River Dam would also decrease temperatures in the Green River very slightly during summer months. It is doubtful this would be a major problem because the change in temperatures would be very slight, perhaps unrecordable 10 miles or so below the White's mouth.

### MITIGATION

Some mitigation of flows is technically possible by releasing additional water from Flaming Gorge Dam to make up for the loss of flow in the White River. However, authorization would not be possible without a change in USBR and Utah Division of Water Rights policies (see Unresolved Issues section of the Summary). This mitigation would be reasonable during low flow periods when a large percentage of the White River flow is depleted. Considerable coordination would be required to assure that day-to-day flows were not depleted. Even if implemented, Flaming Gorge releases could be used to only a limited extent, partially offsetting the cumulative depletions of the Green River by this project and other existing or potential projects in the region.

### UNAVOIDABLE ADVERSE IMPACTS

The cumulative loss of flow in the Green River caused by this project and other proposed water developments in the Green River system could reduce flows sufficiently to adversely impact the bonytail chub and Colorado squawfish, and perhaps the humpback chub and razorback sucker. However, it is the opinion of the FWS that, if dam operation and conservation measures were implemented as described in the Biological Opinion, the proposed White River Dam Project would not jeopardize the continued existence of the endangered fishes.

### Recreation

#### WATER ORIENTED: FISHING, CANOEING, AND RAFTING

#### Anticipated Impacts

The proposed White River Dam and Reservoir would preclude future inclusion in the National Wild and Scenic River System of the 13.5-river-mile (22 km) portion of the river in the inundation area. The reduced and regulated flows below the dam or points of withdrawal (Alternatives 3 and 5) would alter the character of the downstream portion of the White River. This could affect any subsequent classification and/or inclusion of that portion of the river within the National Wild and Scenic River System.

The present limited channel catfish fishery could be altered below the reservoir depending on flow and temperature releases. Since the White River is a very limited and little used fishery, adverse impacts would be minimal. Lamarra (1980) indicated the potential warm water fishery in the proposed reservoir would probably be of low quality, thus not adding greatly to the recreation resource. It is not possible to predict the number of fishermen who would use the reservoir or tailwater.

## ENVIRONMENTAL CONSEQUENCES

Information from people who have canoed the White River indicates that flows as low as 300 cfs are the minimum sufficient for canoe trips (assuming 2 people per canoe without an extensive load of gear). When flows drop below 250 cfs, the risk of canoe damage by submerged rocks increases significantly. Adding more people/gear to the canoe would make higher flows (400 cfs) desirable.

Based on the above and the flow/depletion levels presented in Tables 4-2, 4-3, 4-5, and 4-6, projected canoeing and rafting conditions in the White River were evaluated relative to normal and drought water years with the proposed dam in operation. Those evaluations are presented in Table 4-7. Based on proposed dam operating procedures (see Appendix 3), flows below the dam would be adequate for canoeing and rafting during normal/average water years. However, from August through February, flows minus depletions would approach the lower limit necessary for a satisfactory trip. During drought water years, however, the flow conditions for canoeing and rafting could be unfavorable from June through September.

Below the dam, the flow conditions for canoeing and rafting would be dependent on dam operating procedures. It is expected that canoeists and rafters would have available the near-continuous water releases made below the dam to meet flows recommended by the FWS Biological Opinion. Therefore, flow condition evaluations presented in Table 4-7 assumed relatively stable release rates.

Thus, it is concluded that in years when flows are below normal (dry years), the White River Dam would not have adverse impacts on the existing poor to inadequate canoeing recreation. During normal years, however, canoeing conditions below the dam would be good to excellent from March through July and poor to inadequate October to February.

This analysis does not incorporate the effects of potential depletions from the White River in Colorado. Water developments in Colorado and future developments below the White River Dam would further worsen flow conditions.

Algal blooms and hydrogen sulfide gas released for a short period during the fall overturn (Lamarra 1980) could reduce the value of the reservoir for boating and related activities. It is questionable that the White River Reservoir would significantly add to the boating resources of the region.

### Mitigation

The proposed recreation facility developments, as discussed in Chapter 2 in the Recreation section of Alternative 1, would partially mitigate the loss of canoeing/rafting stream and primitive recreation sites in the inundation area. The proposed boat ramp at Ignatio, a take-out point at the dam, and an access

road below the dam would facilitate continued canoeing/rafting use of portions of the river and/or proposed reservoir.

### Unavoidable Adverse Impacts

Thirteen and one-half river miles (22 km) of canoeing stream would be lost. Also lost or degraded would be the associated opportunities for sightseeing, viewing of wildlife, and dispersed camping normally associated with float trips through this area.

### LAND ORIENTED: CAMPING, ORV'S, AND HUNTING

#### Anticipated Impacts

Adverse impacts would include the loss and/or degradation of various recreational values and dispersed camping opportunities along the White River in the inundation area. The opportunities for historic sightseeing (Old Ignatio Stage Stop) would be lost and the viewing of wildlife in the area would be altered. If future demand demonstrated the need for the campground at Ignatio, this loss would be partially mitigated.

Portions of the unimproved access roads to the White River in the project area would be lost. This would be insignificant due to very low use and the abundance of similar public lands open to off-road vehicle (ORV) use in the immediate vicinity.

Construction of the dam and reservoir would have adverse effects upon deer hunting, due not only to the loss of habitat, which supports an estimated 200 deer, but also to the loss of fawns produced in the area which then emigrate elsewhere. The loss of 200 deer would result in the loss of 936 hunter days per year, using the average deer hunter success data collected by the UDWR for this region. An additional unquantifiable number of hunter days would be lost due to the absence of those deer fawned along the White River who emigrate elsewhere.

The reservoir could better serve waterfowl hunters than the present natural system by attracting migrating waterfowl during the hunting season. This potential increase in waterfowl hunting is unquantifiable.

There would be a loss of up to 48 geese in the reservoir area and 56 geese below the proposed dam, for a total of 104 geese. These 104 geese usually move to other areas before the hunting season; however, the proposed reservoir would attract at least a portion of this population. This would reduce the anticipated loss of up to 450 goose hunter days per year primarily outside the immediate project area.

Activities at the borrow material sites would have limited, short-term effects upon the recreation resources of the project area due primarily to dust, noise, and human activity. Watering to control dust, as pro-

TABLE 4-5  
Projected White River Flows During  
Normal Water Years (cfs)

Months	Normal Mean Flow at Watson Gage	Depletions At White River Dam <sup>a</sup>	Below the White River Dam <sup>b</sup> Residual	At Mouth Near Ouray <sup>c</sup> Residual
Oct.	426	117	309	324
Nov.	396	103	293	304
Dec.	349	84	265	278
Jan.	339	80	259	274
Feb.	396	98	298	394
Mar.	552	168	384	627
Apr.	645	137	508	548
May	1,534	176	1,358	1,362
June	1,804	120	1,684	1,687
July	655	45	610	606
Aug.	435	113	322	310
Sept.	402	109	293	288

Source: Utah Division of Water Resources 1982.

<sup>a</sup>Depletions reflect projected water withdrawals at the proposed reservoir, plus 13 cfs programmed for Tosco.

<sup>b</sup>These would be the flows between the White River Dam and the Mountain Fuel Bridge.

<sup>c</sup>These would be the mean flows near Ouray at the mouth of the White River. This includes the natural flow increases (i.e., streams, springs, etc.) below the White River Dam.

TABLE 4-6

White River Flows During Driest Year of Record (cfs)  
(Worst Case)

Months	Mean Flow at Watson Gage	Depletions at White River Dam	Below the White River Dam Residual	At the Mouth Near Ouray Residual
Jan. 1977	320	76	244	246
Feb.	349	79	270	270
Mar.	395	151	244	262
Apr.	412	160	252	266
May	384	140	244	268
June	264	12	252	254
July	140	[81] <sup>a</sup>	221	205
Aug.	207	0	207	189
Sept.	212	0	212	213
Oct.	270	26	244	241
Nov.	311	59	252	269
Dec.	277	33	244	257

Source: Utah Division of Water Resources 1982.

<sup>a</sup>Brackets, [ ], indicate flow augmented by the amount shown.

TABLE 4-7

Projected White River Flow Conditions for Canoeing and Rafting<sup>a</sup>

Water Year Conditions	Rangely Colorado to White River Dam Reservoir (28 mi/45 km)		White River Dam Reservoir (13.5 mi/22 km)		White River Dam to Mountain Fuel Bridge (30 mi/48 km)		Mountain Fuel Bridge to Green River (20 mi/32 km)	
	Flow Condition	Month <sup>sb</sup>	Flow Condition <sup>c</sup>	Months <sup>c</sup>	Flow Condition <sup>d</sup>	Months	Flow Conditions	Months
Normal/Average Water Year	Excellent.	April thru Oct.	Poor for rafting. Fair to good for canoeing	April thru Oct.	Excellent.  Poor to fair.	April thru July. Aug. thru Oct.	Excellent.  Fair to poor.	April thru June. July thru Oct.
Drought Water Year.	Good to excellent.	April and May.	Poor for rafting. Fair to good for canoeing.	April thru Oct.	Insufficient.	April and May	Insufficient.	April.
	Poor to insuf- ficient.	June and Oct.			Insufficient.	June thru Oct.	Insufficient.	May thru Oct.
	Insufficient.	July thru Sept.						

<sup>a</sup>Flow condition evaluations are based on the flows presented in Tables 4-5 and 4-6 and reports of individuals who have canoed the river. Based on the information available, flows below 300 cfs are rated poor, 300-350 cfs fair, 350-400 good, and 400 or greater excellent. Note that the flows given in the tables are averages; therefore, conditions during any given month would vary.

<sup>b</sup>Months included in the evaluation are April through October which constitute the normal canoeing/rafting season.

<sup>c</sup>Rafting is dependent upon water currents for an enjoyable trip; therefore, the reservoir would provide poor conditions for that activity. Flat-water canoeing is enjoyed by some participants; therefore, the reservoir was rated fair to good for that activity.

<sup>d</sup>Stability of releases would govern the suitability of flows for canoeing and rafting. These evaluations assume relatively stable rates of release.

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posed by the applicant, would mitigate most of the negative effects due to dust.

The roads proposed for construction would provide better access to the river below the proposed dam and the reservoir, thus resulting in a recreation benefit.

### Mitigation

A wildlife mitigation plan for all project facilities would be developed jointly by BLM, FWS, UDWR, and the Utah Division of Water Resources prior to project approval. With implementation of this mitigation, the long-term loss of hunter days would be replaced elsewhere in the region.

### Unavoidable Adverse Impacts

In the short term, up to 936 hunter days for deer and up to 450 goose hunter days would be lost. Dispersed camping values along 13.5 river miles (22 km) of the White River Canyon would be lost.

### Visual Resources

#### ANTICIPATED IMPACTS

Construction of the White River Dam would adversely impact the visual quality of the project area. The site of the dam and reservoir is currently placed by BLM in Visual Resource Management Class II, the highest assigned to any portion of the Bonanza Planning Unit (see Appendix 8). Management objectives would not be met along the section of river affected by the proposed dam and ancillary facilities.

The period of greatest visual impact would be during construction activities at the dam and off-site borrow material areas. Borrow material Site 2 is in a Visual Resource Management Class III area along Utah Highway 45 and the county road to Red Wash, as shown in Figure 3-9. Site 2 would be in the foreground visual zone of travelers along these routes and visitors at the Devil's Playground. While it would be partially shielded by the terrain, it would constitute a visual intrusion in the natural landscape and would not meet visual management objectives until revegetation became fully established. All other areas disturbed for access roads, transmission lines, borrow material sites, and recreation sites would adversely impact the visual quality of the site specific areas.

There would be little difference between the two suggested roads to the dam site on the north side of the river (Alternatives A and B) in terms of visual impact, since both follow existing roads and are not highly visible from other roads.

Either of the power line alternatives would have an impact on the character of the landscape. The greatest visual impact would be in the first 4 or 5 miles of the transmission line, near the proposed dam.

### MITIGATION

Fugitive dust resulting from construction would not be completely eliminated through treatment but would be reduced to an acceptable level by spraying haul roads, borrow material areas, and embankments with water. All unpaved roads used as truck haul routes would be treated to reduce dust emissions. If other dust suppressants were used, they would require approval of the appropriate Federal official.

### UNAVOIDABLE ADVERSE IMPACTS

There would be short- and long-term degradation of existing scenic qualities. Current BLM Visual Resource Management objectives would not be met.

### Land Uses, Plans, and Controls

#### DOMESTIC LIVESTOCK GRAZING

##### Anticipated Impacts

About 47 percent of the livestock forage within the White River Bottoms cattle allotment would be inundated by the proposed reservoir. The loss of forage on Federal land would be 103 animal unit months (AUMs); 270 AUMs would be lost on State and private lands.

There would be little grazing loss resulting from the removal of material from the various sites for dam and road construction, or from the construction of access roads, transmission lines, and recreation sites.

Less than 1 percent of the forage production of the Stateline and Antelope Draw Allotments would be lost by excavation of the borrow material area sites until the areas were revegetated (up to 20 years). This would amount to 41 AUMs and 86 AUMs on the Antelope Draw and Stateline Allotments, respectively.

##### Mitigation

Part of the forage lost on grazing allotments would eventually be mitigated through revegetation. The loss of grazing on private and Ute Indian lands would be compensated for through arrangements made by the Utah Division of Water Resources with the individual landowners.

##### Unavoidable Adverse Impacts

A loss of forage for 23 cattle grazing 4.5 months on public lands would occur within the White River Bottoms cattle allotment for the life of the project. Loss of forage production on the borrow material sites would occur until the areas were revegetated. This reduction in livestock production would cause an economic loss to the rancher.

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### WILDERNESS

#### Anticipated Impacts

There would be no adverse impact upon wilderness resources because the project area does not possess wilderness characteristics.

#### Mitigation

None.

#### Unavoidable Adverse Impacts

None.

### WILD HORSES

#### Anticipated Impacts

The dam and reservoir would have no effect on wild horses in the area since they inhabit the bench areas not the river bottoms. The displacement of wild horses during power transmission system construction would only be temporary and not significant. The horses would return to their natural range within a few weeks after construction was completed.

#### Mitigation

None.

#### Unavoidable Adverse Impacts

None.

### LAND USE PLANS: BLM

#### Anticipated Impacts

The White River Dam Project would not conform with portions of the BLM Bonanza and Rainbow Management Framework Plans (MFPs). Incompatible uses or developments on or adjacent to inventoried archaeology sites in the planning units are not allowed. Because some known sites would be flooded and/or disturbed by construction, this portion of the plan would be violated. Also, there would be a conflict with the VRM classes assigned to the planning units as indicated above.

The Bonanza and Rainbow MFPs also call for nonallowance of surface disturbances which would detract from the natural environment. The dam and reservoir and resulting road construction and borrow material site development would be in conflict with the MFPs. The MFPs call for excluding ORV use adjacent to the White River. Improved access to the river would increase ORV use in this area.

This alternative would not conflict with county or regional plans.

#### Mitigation

Amendments to the MFPs have been proposed and, should the White River Dam be approved, a decision to alter the existing land use plans would also be made. Proposed planning decisions in the MFPs for the White River Area could be adjusted to allow for issuance of a right-of-way for construction of the White River Dam to aid in development of energy resources within the Bonanza and Rainbow Planning Units, subject to mitigative measures identified in this Final EIS.

#### Unavoidable Adverse Impacts

None.

### Cultural Resources

#### ANTICIPATED IMPACTS

There are 32 known prehistoric and historic sites in the project area which would be impacted by construction or inundation of the White River Dam and Reservoir. Construction activities would alter, damage, or destroy surface and subsurface cultural data, as would reservoir inundation or wave action. Five known prehistoric sites would be impacted by removing soils from borrow material sites north of Bonanza. Since only about 25 percent of the designated borrow areas have been inventoried, additional cultural resource sites are likely to occur in those locations.

An increase in access to the area and resultant recreational activities could result in future indirect impacts to cultural resources due to vandalism.

Any alteration, damage, or destruction of these resources could result in one or more of the following:

1. Loss of scientific and cultural information.
2. Loss of physical presence of the resource.
3. Loss of the resource for future research.
4. Loss of resources that may have important cultural affiliations.
5. Loss of artifact material.

#### MITIGATION

The loss of cultural resources and data would be partially mitigated through consultation between the managing agency and the State Historic Preservation Officer to determine the most appropriate means of lessening the impacts. The primary methods for mitigation include:

1. A complete cultural inventory of those areas affected by the project.
2. Avoidance of known cultural resource sites by construction and related activities.

## ENVIRONMENTAL CONSEQUENCES

3. If avoidance were not prudent or feasible, a site-specific data recovery plan would be undertaken for selected sites.

4. The appropriate Federal official would apply consistent management practices at all construction sites for all archaeological and historical resources. Information would be conveyed to the State Historic Preservation Officer or other agencies as appropriate.

A mitigation plan in the form of a Memorandum of Understanding for this project has been signed by BLM and the Utah State Historic Preservation Officer to assure regulatory compliance (see Appendix 11).

### UNAVOIDABLE ADVERSE IMPACTS

Although all project areas would be surveyed for cultural resources prior to any surface disturbances to ensure that no significant prehistoric or historic sites would be damaged, it is possible that some cultural resources could be disturbed during construction activities. Increased ease of access and use of the area could increase the potential for vandalism of archaeological sites.

### Human Resources

#### ANTICIPATED IMPACTS

The effect of the White River Dam construction and operation on human resources would be brief and relatively insignificant, compared to current and projected growth in the area. A high of 50 construction jobs and a low of 20 jobs would be required for construction of the dam and power plant (Bingham Engineering 1982). After construction was completed, 3 permanent jobs would be sufficient for operation. In addition, the Utah Division of Water Resources (1979) suggested that all jobs would be filled from the local population. The Ute Indian Tribe could also contribute to the labor supply. It is likely, however, that if the area's economic growth continues as predicted, labor would have to be imported. Thus, five assumptions were made:

1. Seventy percent of the jobs on the project would be filled from a nonlocal labor force.
2. Additional indirect employment (jobs required for the nonlocal workers) would amount to 25 percent of the nonlocal labor force.
3. About 45 percent of the indirect employment would come from nonlocal people.
4. Single workers would make up 50 percent of the nonlocal construction labor force and 20 percent of the nonlocal indirect labor force.
5. Married workers would have a family size of 3.58.

Using the above assumptions, population could be expected to temporarily increase in the region by approximately 94 persons at most, about 1.5 percent of the 1980 population of Vernal City (U.S. Department of Commerce, Bureau of the Census 1981). Housing needs were calculated using 0.75 dwelling unit per employee for construction workers.

Some reservations should be kept in mind with respect to these projections. First, although all the impact is predicted to be in the Ashley Valley, the surrounding area would experience some growth, possibly including the communities of Bonanza, Jensen, and Dinosaur. Rangely, Colorado, could experience up to 20 percent of the increased population.

Per capita income would likely increase slightly if all workers were local, although the impact would likely be insignificant compared to normal fluctuations for the period of construction. The demand for educational services, law enforcement, health services, financial services, fire protection, and local government financing would not be expected to increase significantly. Industry injury rates for earth dam construction average approximately one disabling injury or death per 2,400 man years, and about 8 man-days lost time per year. Thus, the White River Dam would have less than one disabling injury, and approximately 1,120 lost days due to work-related injury over the construction period, using the maximum employment figures given above (USDI, Bureau of Reclamation 1974).

It is doubtful that significant erosion of local cultural attributes would occur as a result of the White River Dam. In fact, if a local labor force were used, no change would be expected. Even under the maximum immigration assumption, the impacts on communities would likely be of short duration and so spread over time as to be negligible.

It is noted, however, that if the White River Dam were to be constructed at the same time as other interrelated projects, it would contribute to cumulative socioeconomic impacts in the region.

### MITIGATION

None.

### UNAVOIDABLE ADVERSE IMPACTS

There would be a project-related contribution to cumulative socioeconomic impacts caused by concurrent development of other projects.

### PUBLIC ATTITUDES

#### Anticipated Impacts

The majority of people would not change their attitudes regarding the proposed White River Dam Project.

## ENVIRONMENTAL CONSEQUENCES

### Mitigation

None.

### Unavoidable Adverse Impacts

None.

## ALTERNATIVE 2: NO ACTION

If the proposed project or its alternatives were not implemented, the environmental impacts associated with construction and operation would not occur. The existing environmental and socioeconomic trends of the project area would be expected to continue as increasing oil and gas exploration continues. The water resources proposed for development would still be available for future uses in the Colorado River system (i.e., agriculture, fish habitat, municipal-industrial).

Significant impacts to localized populations of game animals are expected as energy development continues. The majority of those impacts is expected from increased hunting pressure of a larger human population and losses in habitat. The general aquatic and terrestrial systems associated with the White and Green Rivers are expected to remain stable, as degradations in habitat are countered by mitigative measures required of developmental activities.

The rural nature of the Uinta Basin and the present quality of life would change as energy development continues. Some of the present social problems faced by the local communities would be aggravated, although an increased tax base would help alleviate many of the worst problems.

The No Action Alternative would require the users of the water developed by the proposed alternatives to seek other means of supplying water. If no water were made available from surface sources, other sources, primarily groundwater, would need to be investigated more intensively. Conservation and reuse of water during oil shale processing and other potential uses would need to be investigated to a greater depth. The unavailability of water could seriously affect the planned energy development in the project area.

The Uinta Basin presently has several recreational sites available; however, more demand for recreational opportunities is expected as population size increases. With the increased cost of travel, however, local sites may be utilized less by tourists and long distance travelers, and hence become more available to the local population. ORV use and hunting could increase significantly.

Recent water development in the Uinta Basin area has been extensive. Flaming Gorge Dam was completed in 1962. The Central Utah Project has a number of completed reservoirs and others are in the development stage on tributaries of the Green and Duchesne Rivers. Demands for water along the White and Green

Rivers are expected to increase, primarily due to oil shale and tar sand development. Even with these and other energy-related demands, it is doubtful the rate of water development in the Uinta Basin area will continue indefinitely at its recent high rate, perhaps for no other reason than most feasible areas have already been developed or are planned for development. The loss of flows in the Green River system due to present development would continue to cause concern for the endangered fishes and other wildlife associated with this stream.

## ALTERNATIVE 3: PUMPING FROM THE WHITE RIVER AND AUGMENTING FROM HELL'S HOLE CANYON RESERVOIR

### Minerals

#### ANTICIPATED IMPACTS

The Hell's Hole Canyon Reservoir would inundate a portion of one oil and gas lease, four unpatented mining claims, and a portion of potentially recoverable oil shale. The reservoir would probably not seriously affect the oil and gas lease; however, an unquantifiable amount of oil shale resource would not be mined for the life of the project. Gilsonton and tar sand are significant mineral resources in this area; however, this alternative would not affect their recovery or use.

### MITIGATION

The adverse impacts associated with the oil shale claims would have to be mitigated by compensation or other arrangements with the lease holders by the Utah Division of Water Resources prior to construction.

#### UNAVOIDABLE ADVERSE IMPACTS

Oil shale recovery would not occur on about 260 acres (105 ha) for the life of the project.

### Paleontology

#### ANTICIPATED IMPACTS

Construction activities associated with this alternative and inundation by the reservoir could disturb the position and relationships of fossils and result in the loss of scientific and educational values. The greatest impact would be in those formations with potential for high paleontological significance (Green River Formation). Road improvements and construction, borrow material removal, power line and pipeline construction, etc., could all directly impact fossil materials. A total of 339.5 acres (137 ha) would be disturbed. Because construction activities associated with this alternative would be confined to the Green River Formation, the paleontological impact would probably

## ENVIRONMENTAL CONSEQUENCES

not be severe because of the relative abundance of typical plants and invertebrates in this formation.

Increased collecting and removal of known fossils in the region would likely result from increased numbers of people associated with the proposed project. Such activity is impossible to quantify but scientifically important fossils could be removed from location without proper documentation of information. Scientific and educational values would be lost.

### MITIGATION

The applicant would obtain the services of a qualified paleontologist approved by the appropriate Federal official. The paleontologist would conduct an intensive survey of all areas to be disturbed which have high potential for paleontological resources. The paleontologist would be available, as needed, during surface disturbance. If the paleontologist determined that paleontological values would be disturbed, construction would be halted until appropriate records or salvage action could be taken.

### UNAVOIDABLE ADVERSE IMPACTS

Even with the suggested mitigation, some unavoidable loss of fossils potentially important to science could occur in 339.5 acres (137 ha).

### Soils

#### ANTICIPATED IMPACTS

The soil depth of the Hell's Hole Dam and Reservoir area ranges from extremely shallow to nonexistent. Much of the area has small pockets of soil intermixed in a loose arrangement of fractured rock. The steepness of the canyon and low density vegetational cover have probably contributed to a rapid natural erosion of fine particles as they are formed. Therefore, the erosion potential of this area is generally low, simply due to lack of soil. Erosion would occur in areas of construction where soil was exposed, especially during construction of the access road down to the canyon floor. This would occur in 339.5 acres (137 ha) of disturbed soil (see Table 4-1).

#### MITIGATION

The mitigation suggested in the Soils section of Chapter 4 for the White River Dam (Alternative 1) would be utilized in disturbed areas with sufficient soil.

### UNAVOIDABLE ADVERSE IMPACTS

A small amount of soil would be lost by erosion from disturbed areas.

## Water Resources

### ANTICIPATED IMPACTS

No significant impacts are expected upon ground-water, wetlands, or floodplains as a result of developing this alternative.

Implementation of this alternative would result in the depletion of certain amounts of water from the White and Green Rivers, as indicated in Tables 4-2 and 4-3. The data for this alternative is the same as the Draft EIS and has not been changed to reflect the flow criteria in the FWS Biological Opinion. These depletions would occur as a result of satisfying the requirement of 70,000 acre-feet (97 cfs) of water needed for energy development.

Under this alternative, water would be pumped from the White River and augmented by releases from Hell's Hole Canyon Dam as necessary to meet the requirement. An examination of the 50-year period of record (1931-1980) indicated that augmentation would have been necessary approximately 20 percent of the time. In 1 year (1977 water year), there was a shortage of approximately 14,000 acre-feet. Evaporative losses from the reservoir would average about 750 acre-feet per year, which would be made up annually by pumping from the White River. This evaporation was included in Tables 4-2 and 4-3.

If upstream water development on the White River occurs in Colorado, the storage from Hell's Hole Canyon Dam would be used more frequently because instream flows would be reduced. Since the quantity of future upstream uses is not known, it is not possible to quantify their effects on the Hell's Hole Canyon Dam Alternative.

The "worst-case" situation in the period of record occurred during Water Years 1976-1978 (see Table 4-3). Table 4-8 provides an indication of water availability and reservoir storage values during this period. Note that even with augmentation Hell's Hole Canyon Dam fails to satisfy the requirement during a 5-month portion of this period.

These depletions would not affect downstream water rights and would be part of Utah's share of the Colorado River Compact waters.

Depletion of this quantity of water from the White River would be expected to increase salinity by approximately 4.1 mg/l in the Colorado River at Imperial Dam, California (USDI, Bureau of Reclamation 1974). Annual costs of salinity increases are estimated to be \$450,000 per mg/l at Imperial Dam (USDI, Bureau of Reclamation 1981a).

#### MITIGATION

None.

TABLE 4-8

Availability of Water From White River  
and Hell's Hole Reservoir  
During the Driest Years of Record<sup>a</sup>

	Observed discharge at Watson (cfs)	Water available for energy development <sup>b</sup> (cfs)	Augmentation required <sup>c</sup> (cfs)	Storage in Hell's Hole Reservoir (acre-feet)
June 1976	1,203	953	-	25,000
July	364	114	-	25,000
Aug.	337	87	10	24,385
Sep.	287	37	60	20,815
Oct.	384	134	-	23,090
Nov.	345	95	2	22,971
Dec.	293	43	54	19,651
Jan. 1977	320	70	27	17,991
Feb.	349	99	-	18,102
Mar.	395	145	-	21,053
Apr.	412	162	-	24,921
May	384	134	-	25,000
June	264	14	83	20,061
July	140	0	97	14,097
Aug.	207	0	97	8,133
Sep.	212	0	97	2,361
Oct.	270	20	77	[2,374] <sup>d</sup>
Nov.	311	61	36	[4,516]
Dec.	277	27	70	[8,820]
Jan. 1978	299	49	48	[11,772]
Feb.	306	56	41	[14,049]
Mar.	457	207	--	6,764
Apr.	603	353	--	18,664
May	1,514	1,264	--	25,000

Source: Utah Division of Water Resources 1982.

<sup>a</sup>Based on the scenario of how the project would have been operated had it existed during the 1976-1978 period.

<sup>b</sup>Allowing 250 cfs for downstream requirements.

<sup>c</sup>Amount needed to meet energy development requirement of 97 cfs.

<sup>d</sup>Brackets [ ] indicate cumulative shortages for months the reservoir would have been empty.

## ENVIRONMENTAL CONSEQUENCES

### UNAVOIDABLE ADVERSE IMPACTS

The White and Green River systems combined would be depleted by a total of up to 70,000 acre-feet per year, plus evaporation. Salinity at Imperial Dam, California, would increase by 4.1 mg/l, creating an annual loss of \$450,000 per mg/l.

### Vegetation

#### ANTICIPATED IMPACTS

An estimated 44 acres (18 ha) of sagebrush-greasewood and shadscale vegetation would be eliminated by construction of the Hell's Hole Canyon Dam and associated structures. The reservoir would inundate an additional 260 acres (105 ha) of sagebrush-greasewood and shadscale vegetation at the normal surface water elevation. The potential loss of productivity would be of local importance to wildlife and livestock.

The majority of the dam embankment materials would be obtained from the reservoir area. These disturbed borrow material areas, in sagebrush-greasewood and shadscale vegetation types, would be inundated by the reservoir or covered by the dam complex. If sufficient borrow material were not available in the reservoir area, other borrow areas would probably be selected farther up Hell's Hole Canyon in sagebrush-greasewood, shadscale, and juniper vegetation types. The acreages disturbed would depend on the amount of borrow material required.

The water diversion and pumping facilities for this alternative would occupy about 0.5 acres (0.2 ha) of riparian vegetation at the mouth of Hell's Hole Canyon on the White River. The pipeline from the pumping station to the base of the dam would disturb a narrow corridor of approximately 3.5 acres (1.4 ha) of riparian and sagebrush-greasewood vegetation.

Considerable construction on steeply sloped juniper and shadscale areas would be required to provide access and power to pumping facilities. Construction along this common corridor would not eliminate a large acreage of existing vegetation, but it could influence surrounding vegetation by increasing the potential erosion hazard. Relocating the existing road in the upper end of the reservoir would also eliminate a small acreage of shadscale and juniper vegetation.

Most of the Hell's Hole Canyon area is sparsely vegetated. Since all but about 0.5 acres (0.2 ha) of the 339.5 acres (137 ha) disturbed or inundated would be upland vegetation, the impacts to vegetation would be minor.

### MITIGATION

Disturbed dam construction areas, borrow material areas, the downstream side of the dam, power line

route, water pipeline, and access road corridors would be revegetated in the same manner as described for disturbed areas in the White River Dam Alternative.

### UNAVOIDABLE ADVERSE IMPACTS

Loss of 0.5 acres (0.2 ha) of riparian and 339 acres (137 ha) of upland vegetation would occur.

### THREATENED, ENDANGERED, AND SENSITIVE PLANT SPECIES

There are no known threatened, endangered, or sensitive plant species inhabiting the Hell's Hole Canyon construction area. Therefore, there are no impacts associated with this environmental element.

### Terrestrial Wildlife

#### ANTICIPATED IMPACTS

The Hell's Hole Canyon Dam would eliminate the habitat for birds and mammals using the reservoir basin. No specific data on annual abundance are available for Hell's Hole Canyon. Numbers of rodents and small birds are expected to be low due to the sparse upland vegetation. Therefore, impacts to these small animals, and the larger carnivores which feed on them, would probably be minor.

Mule deer use Hell's Hole Canyon as an access route between the riparian habitat along the White River and the upland wintering areas. The dam and reservoir would alter some of the movement patterns but would leave some access routes available to the deer. Therefore, adverse impacts to deer would be minor.

The reservoir could enhance the general area for mammals, especially deer and small rodents requiring frequent access to water, by providing offstream water. Frequent drawdown of the reservoir would eliminate this beneficial effect to mammals, as the water supply would not be consistently available except near the dam.

Waterfowl numbers would increase due to the ponded aquatic habitat. Some of these species would nest primarily in the shallow, upper portion of the reservoir. The number of waterfowl that would utilize the area is not known, but would be low if the reservoir fluctuated greatly each year.

### MITIGATION

None.

### UNAVOIDABLE ADVERSE IMPACTS

None.

## ENVIRONMENTAL CONSEQUENCES

### Aquatic Wildlife

#### WHITE RIVER

##### Anticipated Impacts

Alternative 3 would reduce the flows of the White River by a fairly constant 97 cfs (70,000 acre feet/year). This represents from 25 to 30 percent of the normal low flow levels and about 5 to 10 percent of the normal high flow levels (Table 4-2). During drought periods, the percent of depletion increases slightly but never exceeds 35 percent due to the assumption that 250 cfs, or the flow of the river if below 250 cfs, would not be utilized. Few changes in the aquatic ecosystem of the White River would occur due to this loss of flow because the sand-silt substrate of the river would not change dramatically.

During periods when water was released from Hell's Hole Canyon Dam, summer water temperatures in the White River below Hell's Hole Canyon would be reduced. Since this would occur only sporadically and for relatively short periods of time, no significant impact is expected.

The major impact of the Hell's Hole Canyon Dam on the White River aquatic ecosystem would be the loss of flows. Loss of flows could create habitat conditions that could favor exotic fishes over the native species.

##### Mitigation

None.

##### Unavoidable Adverse Impacts

Loss of flows could alter the native aquatic ecosystem in the White River.

#### Threatened, Endangered, and Sensitive Fish Species in the White River

##### ANTICIPATED IMPACTS

The reduction in flow in the White River would not be expected to seriously affect utilization of the river by Colorado squawfish. It is known that squawfish do not use tributary streams considerably smaller than the White River to any extent. Whether this reduction in flow would create a similar nonpreferred situation in the White River is not known, but thought unlikely. Therefore, the Hell's Hole Canyon Project would not adversely impact endangered fish utilization of the White River by itself.

The loss of flows in the White River from this project could adversely affect the White River as squawfish habitat due to insufficient flow.

##### MITIGATION

If this alternative were selected, Section 7 consultation with the FWS would be reinitiated and conservation measures would be implemented in accordance with their Biological Opinion.

##### UNAVOIDABLE ADVERSE IMPACTS

The loss of flows in the White River from this project could adversely affect the White River as Colorado squawfish habitat.

#### GREEN RIVER

##### Anticipated Impacts

Alternative 3 would affect the Green River below the mouth of the White River by reducing the flow by 97 cfs under most conditions. As indicated for the White River Dam Project (Alternative 1), a cumulative reduction in flows in the Green River could cause adverse changes in the fish fauna.

##### Mitigation

None.

##### Unavoidable Adverse Impacts

The Hell's Hole Canyon Project could adversely impact the aquatic ecosystem of the Green River by contributing to the cumulative depletion of flows and slightly reducing temperatures.

#### Threatened, Endangered, and Sensitive Fish Species in the Green River

##### ANTICIPATED IMPACTS

The effect on Colorado squawfish and other endangered fishes would be similar to that discussed for the White River Dam Project. The major impact would be loss of flows.

##### MITIGATION

If this alternative were selected, Section 7 consultation with the FWS would be reinitiated and conservation measures would be implemented in accordance with their Biological Opinion.

##### UNAVOIDABLE ADVERSE IMPACTS

Although the above mitigation could lessen impacts in the Green River, the loss of flow in the Green River could reduce flows sufficiently to adversely affect the habitat of the bonytail chub and Colorado squawfish, and perhaps the humpback chub and razorback sucker.

## ENVIRONMENTAL CONSEQUENCES

### Recreation

#### WATER-ORIENTED ACTIVITIES

##### Anticipated Impacts

The loss of 97 cfs from the White River would affect canoeing activities during low flow periods (August through September). The depletion during drought years could eliminate canoeing.

Water withdrawal and associated pumping facilities would affect the potential for inclusion in and/or classification within the National Wild and Scenic Rivers System (see Alternative 1).

##### Mitigation

None.

##### Unavoidable Adverse Impacts

The loss of 97 cfs could reduce canoeing and rafting opportunities during low-flow periods (August through September) and would eliminate canoeing and rafting in drought years. This alternative could affect potential inclusion into the National Wild and Scenic Rivers System (see Alternative 1).

#### LAND ORIENTED: HUNTING

##### Anticipated Impacts

The Hell's Hole Canyon Dam could reduce deer hunting in the canyon. The number of hunter days in this area is not known but is low, probably less than 20. Deer hunting could also be benefitted a small amount if adult deer used the reservoir for water and therefore congregated in this area in the fall. This would offset the small hunting loss indicated above.

The reservoir would increase the opportunities for waterfowl hunting over that which presently exists in the proposed area. The amount of increase would be small and would depend on the frequency of fluctuations in the reservoir, as discussed in the Terrestrial Wildlife section of this alternative.

##### Mitigation

None.

##### Unavoidable Adverse Impacts

None.

### Visual Resources

#### ANTICIPATED IMPACTS

No formal visual resource study has been made in the Hell's Hole Canyon area. Therefore, no Visual Resource Management Classes have been determined.

Construction of the Hell's Hole Dam Project would reduce the general visual character of the project area. The greatest visual effects would be in the areas where materials necessary for the construction of the dam and road would be removed. Dam construction would also cause visual effects from fugitive dust for 2 years.

##### MITIGATION

Revegetation of the disturbed sites would mitigate much of the reduction in visual quality. Dust would be controlled to a great degree by frequent watering.

#### UNAVOIDABLE ADVERSE IMPACTS

Land disturbances would be visible until revegetation became fully established (approximately 20 years).

#### Land Uses, Plans, and Controls

#### DOMESTIC LIVESTOCK GRAZING

##### Anticipated Impacts

There is currently one grazing allotment in Hell's Hole Canyon (the Hell's Hole Allotment). The proposed dam would affect only a small portion of this allotment, resulting in the loss of approximately 22 AUMs, or use by approximately 28 sheep, from January through April. Approximately 1 mile of the access road used for livestock trailing in upper Hell's Hole Canyon would be inundated. About 40 percent of the allotment affected would be BLM-administered land, the other 60 percent would be private land. Therefore, grazing for about 11 and 17 sheep would be lost from public and private lands, respectively.

##### Mitigation

The private landowners would be compensated for the loss of grazing of 17 sheep through arrangements made by the Utah Division of Water Resources with the individual landowners. The access road would be rerouted along the southwest perimeter of the reservoir.

##### Unavoidable Adverse Impacts

Grazing for 11 sheep for 4 months each year on public lands would be lost for the project's life.

## ENVIRONMENTAL CONSEQUENCES

### WILDERNESS

#### Anticipated Impacts

There would be no adverse effect upon the wilderness resource since the Hell's Hole Canyon area has been eliminated from wilderness consideration.

#### Mitigation

None.

#### Unavoidable Adverse Impacts

None.

### WILD HORSES

#### Anticipated Impacts

The dam would have no effect on the wild horses of the area since they inhabit the bench areas and are, at most, infrequent users of Hell's Hole Canyon.

#### Mitigation

None.

#### Unavoidable Adverse Impacts

None.

### LAND USE PLANS: BLM

#### Anticipated Impacts

The Hell's Hole Canyon dam, reservoir, diversion structure, and associated power transmission system and access roads would be located in areas under the BLM Bonanza and Rainbow MFPs governing public land uses in Uintah County. These plans call for the items enumerated in the Land Use Plans discussion of Alternative 1 in Chapter 3. As indicated below, there would be conflicts with the visual management classes assigned to the area. The construction activity would not conform with nonallowance of surface disturbance which would detract from the natural environment. The portions excluding ORV use adjacent to the White River would also be violated by construction vehicles/equipment. Also the resultant improved access to the river would increase ORV use in the area.

#### Mitigation

Disturbed areas would be recontoured to blend with the existing topography and revegetated with natural cover types. All temporary roads would be obliterated and revegetated when no longer needed.

Amendments to the MFPs have been proposed and, should the Hell's Hole Canyon Dam be approved, a decision to alter the existing land use plans would be made before permits for rights-of-way were issued.

#### Unavoidable Adverse Impacts

The current BLM MFP objectives would not be met. Refer to Chapter 3, Land Use Planning section, for more detailed information.

### Cultural Resources

#### ANTICIPATED IMPACTS

No cultural sites were found in a reconnaissance survey of Hell's Hole Canyon, although there is the possibility of some prehistoric lithic scatters. Therefore, the effects of this alternative upon cultural resources would be very limited or nonexistent.

#### MITIGATION

Mitigation would be the same as in Alternative 1.

#### UNAVOIDABLE ADVERSE IMPACTS

A small but unquantifiable number of cultural sites important to science and education could be lost.

### Human Resources

#### ANTICIPATED IMPACTS

Construction of Hell's Hole Canyon Dam would require from 20 to 50 workers (Bingham Engineering 1982). This means the population of Vernal and the surrounding area could increase by up to 94 individuals (Table 4-9), requiring a maximum of 24 housing units (Table 4-10). The same assumptions described in the Human Resources section for the White River Dam Project were used in this analysis and approximately the same socioeconomic impacts would occur.

#### MITIGATION

None.

#### UNAVOIDABLE ADVERSE IMPACTS

There would be a project-related contribution to cumulative socioeconomic impacts caused by concurrent development of other projects.

TABLE 4-9  
Employment and Population Effects of  
Hell's Hole Dam Alternative

	First 2 Years		Second 2 Years		Permanent
	High	Low	High	Low	
Total Employment	60	20	40	20	3
Nonlocal Workers	42	14	28	14	2
Indirect Employment	11	4	7	4	1
Nonlocal Indirect Employment	5	2	3	2	0
Nonlocal Population					
Single	22	7	15	7	1
Household	89	30	59	30	4
Total	111	37	74	37	5

TABLE 4-10  
Housing Demands From Hell's Hole Dam Alternative

	First 2 Years		Second 2 Years		Permanent
	High	Low	High	Low	
<u>Construction Demand</u>					
Single Family	11	5	7	5	3
Apartment	3	1	2	1	0
Mobile Home	14	7	10	7	0
Other	3	2	2	2	0
Total	31	15	21	15	3
<u>Indirect Demand</u>					
Single Family	2	1	1	1	1
Apartment	1	0	0	0	0
Mobile Home	1	1	1	1	0
Other	0	0	0	0	0
Total	4	2	2	2	1
<u>Total Housing Demand</u>					
Single Family	13	6	8	6	4
Apartment	4	1	2	1	0
Mobile Home	15	8	11	8	0
Other	3	2	2	2	0
Total	35	17	23	17	4

## ENVIRONMENTAL CONSEQUENCES

### ALTERNATIVE 4: PUMPING FROM THE GREEN RIVER

#### Minerals

##### ANTICIPATED IMPACTS

There are 40 oil and gas leases that would be crossed by the proposed Green River Pipeline, but no unpatented mining claims would be crossed. There would be no impact to the leases; exploration or extraction could be blocked for a short time during construction.

##### MITIGATION

None.

##### UNAVOIDABLE ADVERSE IMPACTS

None.

#### Paleontology

##### ANTICIPATED IMPACTS

Direct impacts from construction would occur on up to 45 acres (18 ha) for the pump stations and on 380 acres (154 ha) from the pipeline construction, which includes considerable excavation. A number of important fossils could be destroyed during construction. An important fossil floral locality in the corridor was recently found by Miller and Webb (1980). Increased collecting and removal of known fossils in the region would likely result from increased numbers of people associated with the proposed project. Such activity is impossible to quantify, but scientifically important fossils including floral remains would be removed from location without proper documentation of information. Scientific and educational values would be lost.

##### MITIGATION

Mitigation would be the same as Alternative 1.

##### UNAVOIDABLE ADVERSE IMPACTS

Even with the suggested mitigation, some unavoidable loss of fossils potentially important to science could occur in 380 acres (154 ha).

Increased collecting and removal of known fossils in the region would likely result from increased numbers of people associated with the proposed project. Such activity is impossible to quantify, but scientifically important fossils including floral remains would be removed from location without proper documentation of information. Scientific and educational values would be lost. There would remain a high potential for inadvertent damage to subsurface fossils on disturbed areas.

#### Soils

##### ANTICIPATED IMPACTS

Erosion during and after construction of the pump stations on 45 acres (18 ha) and of the pipeline on 380 acres (154 ha), primarily due to vegetation and soil removal on steep slopes, would be the major problem. Over 75 percent of the pipeline route is fairly level, while there are two steep areas composed of bedrock with little or no soil. The removal of topsoil from the trench area could hamper revegetation efforts following construction. Also, spoil (excess excavated material) would be expected, as not all would be replaceable around the pipe.

##### MITIGATION

The primary mitigation technique would be that described for the White River Dam Project: a two-step revegetation program of disturbed areas. During construction of the pipeline trench, the topsoil would be moved to the side, bladed back after the trench was filled, and then revegetated according to the revegetation program. This would assure that the best soil was on top for revegetation. The trench would be backfilled with spoil when it met the necessary engineering requirement. The fill would be slightly mounded over the trench to allow for settling. Excess spoil materials would be used for pump station pads if they met the geotechnical criteria. Extra spoil materials would be placed in approved waste sites, shaped to follow the existing natural contours, and revegetated with native plants. Blasting for trench excavation would be done according to authorized techniques, avoiding damage to other facilities. Erosion on slopes over 4 percent in grade would be minimized by construction of waterbars where vegetation had been disturbed.

##### UNAVOIDABLE ADVERSE IMPACTS

An unquantifiable amount of erosion would occur during construction on 425 acres (172 ha) but its magnitude would be small.

#### Water Resources

##### ANTICIPATED IMPACTS

The construction of the Green River Pipeline would not affect groundwater, floodplains, or wetlands. Development of this alternative would not produce significant impacts on water resource components other than depleting water and reducing downstream water quality in the Green River.

As indicated in Tables 4-2 and 4-3, this alternative would deplete no water from the White River and a continuous amount of 70,000 acre-feet (97 cfs) from the Green River under both "normal" and "worst-

## ENVIRONMENTAL CONSEQUENCES

case" conditions. Water storage for this alternative would be Flaming Gorge Reservoir.

Depletions at the level indicated in Table 4-2 from the Green River would cause an estimated increase of 4.1 mg/l in Colorado River salinity at Imperial Dam, California. Annual cost of salinity increases are estimated to be \$450,000 per mg/l increase at Imperial Dam (USDI, Bureau of Reclamation 1981a).

### MITIGATION

None.

### UNAVOIDABLE ADVERSE IMPACTS

The Green River would be depleted by 70,000 acre-feet (97 cfs) of water per year. Salinity at Imperial Dam, California, would increase by 4.1 mg/l. The salinity increase would create an annual loss of \$450,000 per mg/l.

### Vegetation

#### ANTICIPATED IMPACTS

Construction and operation of the project components required to pump water from the Green River to the White River would disturb up to 15 acres (6 ha) of riparian vegetation along the Green River and approximately 380 acres (154 ha) of sagebrush-greasewood, shadscale, and juniper vegetation along the proposed water pipeline route. Of this land, only 45 acres (18 ha) including up to 15 acres (6 ha) of riparian vegetation would be occupied (Table 4-1). Due to the low productivity of the upland vegetation (see Chapter 3, Vegetation section) and the small amount of riparian vegetation, the impact of this alternative on vegetation would be minor.

#### MITIGATION

Areas disturbed by the construction of the water pipeline, pumping facilities, access roads, and power lines would be revegetated in the same manner as described for disturbed areas in the White River Dam Alternative. In addition, travel would be restricted to the right-of-way or established roads and trails; equipment activities would be allowed only within the right-of-way and authorized temporary access roads; and scalping of vegetation would be minimized.

### UNAVOIDABLE ADVERSE IMPACTS

Up to 15 acres (6 ha) of riparian vegetation and up to 30 acres (12 ha) of upland vegetation would be occupied by the three pumping stations and associated access roads following pipeline construction. Disturbed areas could require approximately 15 years for native vegetation to become re-established.

## THREATENED AND ENDANGERED PLANT SPECIES

### Anticipated Impacts

Populations of the threatened Uinta Basin hookless cactus could be removed along the pipeline route. Since the major populations of this species occur elsewhere, it is doubtful this species would be adversely impacted by this action. However, if this alternative were selected, Section 7 consultation with the FWS would be reinitiated.

### Mitigation

Intensive on-the-ground surveys of the pipeline route and pumping station sites would be necessary before approval for construction. BLM, FWS, and the Utah Division of Water Resources would develop a mitigation plan based on the results of the survey.

### Unavoidable Adverse Impacts

An unquantifiable number of Uinta Basin hookless cactus could be destroyed.

### Terrestrial Wildlife

#### ANTICIPATED IMPACTS

Alternative 4 would occupy up to 15 acres (6 ha) of riparian habitat on the Green River and disturb about 380 acres (154 ha) of upland habitat along the pipeline route. Densities of small mammals and birds in these upland areas along the pipeline route are low (Smith and Associates 1979), so impacts would be insignificant. The loss of a small area (15 acres) of riparian habitat would be insignificant when compared to the total riparian habitat along the Green River. There would be short-term impacts to pronghorn antelope during construction, due to restricted access and disturbance to feeding and fawning grounds. Following construction and revegetation, impacts to antelope would be positive because of additional forage.

#### MITIGATION

Pronghorn fawning grounds would be protected by prohibiting construction activities in these areas from May 10 through June 20.

### UNAVOIDABLE ADVERSE IMPACTS

None.

### Aquatic Wildlife

#### ANTICIPATED IMPACTS

The only impact to the aquatic flora and fauna, including endangered species, involves a 97-cfs reduc-

## ENVIRONMENTAL CONSEQUENCES

tion in flow in the Green River below Walker Hollow. Impacts of such a flow depletion were discussed for the White River Dam and Hell's Hole Canyon Dam Alternatives. The major impact would be the adverse effect of flow reduction on bonytail chub and Colorado squawfish, and perhaps humpback chub and razor-back sucker.

### MITIGATION

If this alternative were selected, Section 7 consultation with the FWS would be reinitiated.

### UNAVOIDABLE ADVERSE IMPACTS

Alternative 4 could adversely impact the aquatic ecosystem of the Green River by depleting flows.

### Recreation

#### ANTICIPATED IMPACTS

The pipeline from the Green River would result in little or no effect to the recreation resources of the project area. The opportunities for ORV use would be affected during the actual construction phase of the project when there would be some obstructions, open trenches, etc. These could easily be circumvented. Some very limited effects on pronghorn antelope hunting could also occur during construction.

#### MITIGATION

None.

#### UNAVOIDABLE ADVERSE IMPACTS

None.

### Visual Resources

#### ANTICIPATED IMPACTS

A small section (2 miles) of the pipeline and ancillary facilities adjacent to the White River would not meet Visual Resource Management objectives.

#### MITIGATION

Pumping sites adjacent to the Green and White Rivers would be concealed by topographic features and revegetated. Pumping stations along the route would be constructed to harmonize with form, color, and texture of the landscape.

#### UNAVOIDABLE ADVERSE IMPACTS

Scenic quality would be degraded and Visual Resource Management objectives would not be met along the Green and White Rivers.

## Land Uses, Plans, and Controls

### DOMESTIC LIVESTOCK GRAZING

#### Anticipated Impacts

Forage from 380 acres (154 ha) of grazing lands would be temporarily lost for up to 15 to 20 years. These rangelands fall in four allotments. Three pump station sites of up to 15 acres (6 ha) each would be permanently lost to grazing. This loss would be minor because there are approximately 154,000 acres (62,322 ha) in the allotments through which the pipeline would be placed.

#### Mitigation

Revegetation of the pipeline trench as indicated in the Vegetation section of this alternative would eventually mitigate the loss of vegetation after construction.

#### Unavoidable Adverse Impacts

There would be a short-term loss of 380 acres (154 ha) of forage on four allotments. A long-term loss of 45 acres (18 ha) would occur because of the pumping stations.

### WILDERNESS

#### Anticipated Impacts

There would be no adverse effects on wilderness since none of the proposed pipeline route is being considered for inclusion in the wilderness system.

#### Mitigation

None.

#### Unavoidable Adverse Impacts

None.

### LAND USE PLANS

#### Anticipated Impacts

This alternative would not have an impact upon the BLM Bonanza MFP, because, since the Draft EIS was published, the MFP has been amended to allow for an additional north-south corridor for linear facilities.

#### Mitigation

None.

#### Unavoidable Adverse Impacts

None.

## ENVIRONMENTAL CONSEQUENCES

### Cultural Resources

#### ANTICIPATED IMPACTS

There are two known cultural sites along the pipeline route. Since the entire pipeline route has not been investigated, unknown sites could be encountered. Cultural sites could be disturbed by pipeline construction.

#### MITIGATION

Mitigation would be the same as in Alternative 1.

#### UNAVOIDABLE ADVERSE IMPACTS

A small but unquantifiable number of cultural sites important to education and science could be lost.

### Human Resources

#### ANTICIPATED IMPACTS

The Green River Pipeline Alternative would have a slightly larger employment and population impact than the White River Dam. Between 80 and 100 construction jobs would be created for 2 years. Table 4-11 indicates employment and population projections. Due to the specialized nature of pipeline construction, 90 percent of the work force was assumed to be non-local. Other assumptions used were the same as discussed for the White River Dam Alternative. Operation of the pipeline was assumed to require 3 employees, the same number of permanent jobs as other alternatives.

Population was projected to increase by about 188 to 266 persons. Housing demand would increase up to a total of 75 units (Table 4-12). Therefore, for this alternative, socioeconomic impacts would be slightly greater than, although similar to, those described for Alternative 1.

#### MITIGATION

None.

#### UNAVOIDABLE ADVERSE IMPACTS

There would be a project-related contribution to cumulative impacts due to concurrent development of other projects.

### ALTERNATIVE 5: PUMPING FROM THE WHITE RIVER AND AUGMENTING FROM THE GREEN RIVER

#### Anticipated Impacts

Impacts of this alternative would be the same as indicated for portions of Alternatives 3 and 4; therefore, they will not be reiterated here.

Impacts to minerals, paleontology, soils, terrestrial wildlife, recreation, visual resources, and cultural resources would be of the same magnitude as those for the pipeline in Alternative 4. The pipeline in Alternative 5 would be smaller, but would have more pump stations (7) than Alternative 4 (3 stations). The route would be exactly the same; therefore, the major difference involves loss of upland vegetation associated with pump stations: up to 30 acres (12 ha) for Alternative 4 and 90 acres (36 ha) for Alternative 5. Since this occurs in relatively unproductive upland areas, no substantive differences in impacts would be expected.

Impacts to water resources and aquatic wildlife in the White and Green Rivers would be identical to those discussed for Alternative 3. The only significant impacts associated with the infrequent pumping from the Green River would be flow depletion.

Impacts to canoeing and rafting would be the same as those discussed in Alternative 3.

Impacts to land use would be the same as those discussed in Alternatives 3 and 4.

Mitigation and unavoidable adverse impacts would correspond to those indicated in Alternatives 3 and 4.

### ENERGY ANALYSIS OF THE WHITE RIVER DAM ALTERNATIVES

An energy accounting study was completed on the White River Dam and its three possible alternatives to evaluate their energy requirements (see Appendix 5).

#### Method Used

First, the items used in each project were identified. Second, energy per physical unit conversions, e.g., Btu/cy (cubic yard), were obtained. Third, if energy per physical unit conversions were not available, energy per dollar conversions were employed. Finally, the total projected energy for each alternative was found by adding energy requirements for each component.

#### Source of Conversions

The majority of the energy per dollar conversions were those developed by the Energy Research Insti-

TABLE 4-11  
Employment and Population Impacts of  
the Green River Pipeline Alternative

	Construction		Permanent
	High	Low	
Total Employment	100	80	3
Nonlocal Workers	90	72	2
Indirect Employment	23	18	1
Nonlocal Indirect Employment	10	9	0
Nonlocal Population			
Single Household	47	38	
Household	219	150	
Total	266	188	

TABLE 4-12  
Housing Demands for the Green River  
Pipeline Alternative

	Construction		Permanent
	High	Low	
<u>Construction Demand</u>			
Single Family	23	18	3
Apartment	6	5	0
Mobile Home	31	25	0
Other	8	6	0
Total	68	54	3
<u>Indirect Demand</u>			
Single Family	4	3	1
Apartment	1	1	0
Mobile Home	2	2	0
Other	0	0	0
Total	7	6	1
<u>Total Housing Demand</u>			
Single Family	27	21	4
Apartment	7	6	0
Mobile Home	33	27	0
Other	8	6	0
Total	75	60	4

## ENVIRONMENTAL CONSEQUENCES

tute and listed in Bullard et al. (1976). These conversions generally proved to be the best available. However, for the earthwork and cement, Bell's (1977) Btu/cy figures were used because they involve no energy to dollars inaccuracies. In addition, Hannon's (1978) and Gillard's (1975) conversions were used for steel rebar and general energy per dollar respectively.

### Results

As shown in Table 4-13, the low energy alternatives for construction would be the White River Dam and Alternative 3. Alternative 4 would be the most energy intensive, requiring the most energy for both construction and operation, while Alternative 5 would be the second most energy intensive.

While the above analysis focused on energy required for construction activities and pumping, it is noted that only the White River Dam, with the proposed hydroelectric power plant, would be a direct energy producer. It is expected that up to  $1.1 \times 10^{11}$  Btu would be generated each year by the power plant.

### SUMMARY OF UNAVOIDABLE ADVERSE IMPACTS, IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES, AND THE RELATIONSHIP OF SHORT-TERM USE OF THE ENVIRONMENT TO MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

This summary is presented at the end of Chapter 2 in the form of Table 2-1. Unavoidable adverse impacts discussed in the preceding sections of Chapter 4 are compared by alternative and environmental element. This summary does not consider impacts of low significance, those of short duration, or those that are mitigated in Chapters 2 and 4.

The relationship between short-term uses of the environment to maintenance and enhancement of long-term productivity is discussed for each alternative and resource in Table 2-1.

### CUMULATIVE IMPACTS

The Uinta Basin in Utah and the adjacent portions of western Colorado are expected to contain a significant portion of the future energy development in the western United States. Coal, oil shale, and tar sand are the major energy reserves. Therefore, large increases in human population and consumptive use of water are

expected. The White River Dam Project, or one of its alternatives, would add to the cumulative impacts of both water development (depletion) and increased population.

### Water Resources

As discussed previously, the White River Dam Project would have an active storage capacity of 70,700 acre-feet and is expected to deplete up to 75,000 acre-feet, plus 5,500 acre-feet for evaporation. Its alternatives would deplete approximately 70,000 acre-feet of water from the Upper Colorado system. Table 4-14 indicates other projected depletions from the various drainages of the system, based primarily upon USDI (1981) information.

The projected depletions from the system total 678,500 to 760,500 acre-feet per year (937 to 1,050 cfs), of which the White River Dam Project constitutes approximately 10 percent. Under appropriate economic conditions, oil shale development in the region could be expected to increase considerably and demand substantially more water from the Upper Colorado system than reflected in the table.

The Hayden-Craig Project near Maybell, Colorado would require an estimated 20,000 acre-feet annually from the Yampa River by 1990 for operation of additional steam power plants. Present depletions for the existing power plant amount to 10,000 acre-feet.

The Cheyenne Stage II Water Diversion Project would divert from 16,000 to 20,000 acre-feet per year from the Yampa River Basin. The withdrawals from the Little Snake River would enter a system to supply water for municipal uses in Cheyenne, Wyoming.

The Little Snake Water Management Project would supply additional water to communities along the North Platte River system in Wyoming. New depletions could range from 83,000 to 114,000 acre-feet per year depending on the alternatives.

The Juniper-Cross Mountain Project on the Yampa River would involve construction of two hydroelectric dams. The Juniper Dam, 25 miles southwest of Craig, Colorado would create a 1,080,000 acre-foot reservoir. The Cross Mountain Dam, 50 miles west of Craig, would create a 142,000 acre-foot reservoir and serve as a regulating dam for peaking power releases from Juniper Dam. The project would deplete 75,000 acre-feet from the Yampa River. Of this total, 63,500 acre-feet would be evaporative losses and the remainder used for municipal, industrial, and irrigation purposes. The project would significantly affect downstream flows. High runoff flows during May, June, and July could be reduced as much as 73 percent. Generally, flows during the remainder of the year would be increased.

The Central Utah Project is composed of several

TABLE 4-13

Summary of Energy Analysis (in Btu)

	Alternative 1 White River Dam	Alternative 2 No Action	Alternative 3 Hell's Hole Dam	Alternative 4 Green River Pumping	Alternative 5 Green River Supplement Pumping
Construction for 2-Year Period	$7.72 \times 10^{11}$	0	$7.64 \times 10^{11}$	$4.1 \times 10^{12}$	$2.39 \times 10^{12}$
Operation for 80 or more years	$[1.1 \times 10^{11}]^a$ produced	0	$1.26 \times 10^{10}{}^b$ Btu/cy used each year	$4.68 \times 10^{11}$ Btu/cy used each year	$1.18 \times 10^{11}$ Btu/cy used each year

Source: Bio-West, 1980.

<sup>a</sup>Brackets [ ] indicate energy produced by the proposed Alternative 1 power plant.<sup>b</sup>Example: How Btu equivalents were calculated.

Conversion factor: 3,413 Btu = 1 KWH

Estimated annual electrical power use (pump operations) of Alternative 3 = 3,710,000  
( $3.71 \times 10^6$ ) KWH $3.71 \times 10^6$  KWH/year  $\times$  3,413 Btu/KWH =  $1.26 \times 10^{10}$  Btu/year.

## ENVIRONMENTAL CONSEQUENCES

subunits, four of which would deplete water from the Duchesne River drainage. The Upalco and Uintah units would deplete 12,000 and 28,000 acre-feet per year, respectively, principally for irrigation use. The Jensen unit would deplete 15,000 acre-feet per year for municipal and industrial uses. The Bonneville unit would eventually deplete 166,000 acre-feet per year to supply water and power to the Bonneville Basin. Of this total, 31,000 acre-feet is currently being depleted.

Depletion of 50,000 acre-feet of water from the Duchesne drainage to irrigate deferred Ute Indian lands is expected before the year 2000.

The Bonanza Power Plant Project will deplete approximately 18,000 acre-feet of water from the Green River near Walker Hollow, south of Jensen, Utah.

It is projected that oil shale development in Colorado will deplete 90,000 to 172,000 acre-feet of water from the White River by 2000 (U.S. Water Resources Council 1981).

The White River Dam Project would deplete 80,500 acre-feet and the Ute Indian irrigation project an additional 31,000 acre-feet from the White River.

The combined worst-case depletions of these potential development projects on the White River (283,500 acre-feet per year) equates to a continuous flow of 392 cfs, and would reduce the average annual flow (457,000 acre-feet per year as measured at the Watson gage during the period 1963-1978) by approximately 62 percent. The total depletion would exceed the volume of flow recorded in 1977, the driest year on record. Flow reductions of this magnitude would have significant effects on the natural resource values in and along the river. The magnitude of impacts would increase progressively downstream with each successive point of withdrawal.

The total worst-case depletions from the projects listed in Table 4-14 would constitute approximately 19 percent of the average annual volume of flow of the Green River (3,993,000 acre-feet, as measured at Green River, Utah during the period 1963-1978). The total depletion equates to approximately 28 percent of the volume of flow recorded in 1977. As with the White River, reduction and regulation of flows on this order of magnitude would have significant effects on the river environment and natural resource values and could cause aquatic ecosystems to change significantly.

A variety of other potential projects, and hence depletions, have been identified, discussed and/or proposed on the Upper Colorado River system, but cannot be quantified or even considered probable at this time. Not all of them can or will be built. For example, in the Yampa River Basin, some of the proposed developments overlap at nearly identical sites and in aggregate would develop more water than is available (USDI, National Park Service 1979).

The cumulative impact of depleting large quantities of water from the system can be expected to result in over 19 mg/l increases in salinity at Imperial Dam, California, primarily because the depletions would be of relatively high quality relative to downstream water quality.

Mitigation for salinity impacts on the entire Colorado River system (including the Green and White Rivers) is being addressed in an interagency program under the leadership of USBR. (Authority is granted under the Colorado River Basin Salinity Control Act of 1974 (P.L. 93-320)). The Act includes two main provisions: Title I requires features to comply with the United States obligation to Mexico; Title II authorizes construction of salinity control features with the goal of maintaining lower mainstem concentrations at or below 1972 levels (USDI, Bureau of Reclamation 1981c). The program is coordinated with various agency plans and activities throughout the Basin. Thus, the problem of controlling salinity levels is to be treated Basin-wide and includes the Upper Colorado Basin's plans to develop its compact-apportioned waters. On this basis, any salinity increases arising from water depletions by Utah's use of water under the Colorado River Basin entitlements for the White River Dam Project are expected to be offset by the Colorado River Water Quality Improvement Program and related activities. These activities include control of diffuse sources of salinity, dilution by mixing with higher quality water, and desalination plants as provided by the Salinity Control Act discussed above (Miller 1981).

The cumulative impacts of these water depletions upon both irrigation and future water supply would be essentially a matter of the water not being available for such uses in the short term. Although not irreversibly committed, reallocation of this water would be difficult from both economic and institutional aspects.

### Aquatic Wildlife

The cumulative effect of flow depletions from the proposed White River Dam, as well as other proposed projects in the Upper Colorado River Basin, could cause changes in the fish fauna. However, a greater reduction in flow than that proposed for this project alone would be required to cause this change. A major significant impact of the proposed project would be its effect upon the threatened and endangered fish species of the Upper Colorado River system. This impact would be most serious in terms of the cumulative effect of the several developmental projects planned or underway in the system. Individually, certain of the projects may not have a serious effect on the fish populations but, considered cumulatively, would likely significantly impact the species of concern.

Available data indicate the endangered bonytail chub has been seriously impacted, to near extinction, by past water depletions. Present data also indicate

TABLE 4-14  
Potential Additional Depletions From the  
Upper Colorado River System<sup>a</sup>

Drainage	Project	Acre-feet Depletion
Yampa	Hayden-Craig	10,000
	Cheyenne Stage II Water Diversion	20,000
	Little Snake Water Management	114,000
	Juniper-Cross Mountain	75,000
Duchesne Brush Creek Ashley Creek Lake Fork	Central Utah Project (4 units)	190,000
	Deferred Indian Lands	50,000
Green	Bonanza Power Plant	18,000
White (in Colorado)	Oil Shale Development	90,000 to 172,000
White (in Utah)	White River Dam	80,500
	Ute Indian Irrigation <sup>b</sup>	31,000
Total Depletions -		678,500 to 760,500

Source: USDI 1981; Bollinger 1981; Wyoming Water Development Commission 1980; and U.S. Water Resources Council 1981.

<sup>a</sup>Best available assumptions to the year 2000.

<sup>b</sup>Based on irrigation of 12,833 acres (5,194 ha) with about 5 percent (31,000 acre-feet) of return flow.

## ENVIRONMENTAL CONSEQUENCES

the Colorado squawfish, also endangered, had lowered reproductive success in the Green River, the most reproductively successful habitat remaining for this fish, in a recent year of natural drought. This information, data from the Colorado River, and the FWS Biological Opinion suggest there is a flow level below which Colorado squawfish reproductive success would decline. The actual flow level where this would occur is not known. Therefore, the cumulative water depletions of the projects presently being developed and proposed for development in the near future could cause adverse impacts to the bonytail chub and Colorado squawfish closer to extinction in the Green River system.

### Terrestrial Wildlife

The cumulative effects of the loss of wildlife habitat, especially for game mammals such as deer, from energy and water development within the Upper Colorado River Basin could result in a substantial loss of animals and, in turn, cause the loss of a large number of hunter days. As discussed earlier in this chapter, the unmitigated loss due to the White River Dam would be approximately 936 hunter days for deer. If the effects from other projects were similar, the cumulative impact would be substantial. Cumulative impacts to other important wildlife species such as waterfowl (geese), raptors, and endangered species could also be substantial. The unmitigated loss of 995 acres of riparian habitat, when combined with losses from other projects that adversely affect riparian habitat within a 200-mile radius, would have a substantial cumulative impacts on a wide variety of wildlife species.

The cumulative effects of the loss of grazing resources due to energy and water developments in the Upper Colorado Basin would be moderate. This cumulative loss would need to be examined from the standpoint of a loss to the range resources of the area and the resulting economic value. The loss of the grazing resource due to the White River Dam would be a small contribution when examined from a cumulative standpoint.

### Recreation

The cumulative effects of energy and water developments within the Upper Colorado River Basin could reduce the viability of both commercial and private river running on the entire Colorado system. While flows diverted from the White River would, by themselves, have little impact on this activity, the cumulative water reduction could shorten the season and reduce the number of trips through Desolation, Gray, Cataract, and the Grand Canyons.

Projections of the future flow regime of the Green River if the projects listed were implemented are not available. However, it is anticipated that the cumulative

effect of these projects would include a large reduction in spring runoff flows and significantly reduced flows during the summer months. During normal/average water years flow reductions could reduce river running through Desolation Canyon during August and September. During dry water years (e.g., 1977) the flow reductions could reduce rafting possibilities after June.

As indicated in Table 4-7, the cumulative effects of the White River Dam Project could effectively eliminate canoeing/rafting on the final 20 miles of the White River during dry or critically dry years.

The combined effect of the withdrawals from the White River in Colorado and the White River Dam Project could effectively eliminate canoeing opportunities above and below the proposed dam after July during normal water years.

Impacts to recreation resources in the Uinta Basin and adjacent areas would result from the cumulative population growth projected for the area. Employment growth associated with energy and water development projects could double the present population within the next 10 years. Popular recreation facilities presently used at or near capacity would experience further crowding, deterioration of developed facilities, and/or reduced visitor satisfaction.

### Human Resources

The White River Dam would, at the high point of construction, employ up to 50 persons. The Green River Pipeline would employ up to 100 persons. Some of them could immigrate from other places with their families. The net effect would be up to 94 additional persons living in Uintah County, Utah, and Rio Blanco County, Colorado, for the White River Dam Project and 266 additional persons for the Green River Pipeline. These people would place additional demands on housing, schools, police, fire protection, health care, roads, and other services. These new people, in addition to those associated with other energy and water development projects within the Uinta Basin, could have a significant impact on local communities.

As summarized in Table 4-15, a substantial increase in employment is projected for the project vicinity due to energy and water development during the next 15 years. A peak figure of 11,440 is projected for 1988. This figure represents a substantial immigration of workers to the area. In light of these projections, the cumulative effects of water and energy development on human resources and quality of life in eastern Utah and western Colorado will be great, but the portion of that impact attributed to the White River Dam Project would be small. A detailed study of this cumulative effect has been published by the Office of the Utah State Planning Coordinator (1981).

TABLE 4-15

Direct Employment Estimates<sup>a</sup>  
(Medium Scenario)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
<u>White River Shale</u>															
Construction	132	576	1,830	1,032	346	1,032	2,390	4,037	3,797	1,518	280	0	0	0	0
Operation	0	0	10	68	369	838	885	991	1,286	1,867	2,215	2,215	2,215	2,215	2,215
<u>Geokinetics</u>															
Operation	28	37	50	100	150	200	250	300	350	400	450	500	500	500	500
<u>Tosco, Sand Wash</u>															
Construction	0	30	400	1,100	1,900	2,650	3,150	3,250	2,000	1,000	500	0	0	0	0
Operation	0	0	0	0	0	450	825	1,125	1,200	1,200	1,200	1,200	1,200	1,200	1,200
<u>Paraho Shale</u>															
Construction	0	800	1,300	1,300	1,000	300	0	0	0	0	0	0	0	0	0
Operation	0	0	0	500	1,000	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
<u>White River Dam</u>															
Construction	0	94	94	36	36	0	0	0	0	0	0	0	0	0	0
Operation	0	0	0	0	5	5	5	5	5	5	5	5	5	5	5
<u>Bonanza Power</u>															
Construction	119	275	760	1,021	710	252	0	0	0	0	0	0	0	0	0
Operation	2	4	41	108	172	200	200	200	200	200	200	200	200	200	200
<u>Central Utah Project<sup>b</sup></u>															
Construction	485	850	970	1,165	850	255	20	5	85	95	280	290	215	225	45
Operation	0	0	0	0	0	27	27	27	27	27	27	27	27	27	27
<u>TOTAL</u>															
Construction	736	2,625	5,354	5,654	4,842	4,489	5,560	7,292	5,882	2,613	1,060	290	215	225	45
Operation	30	41	101	776	1,696	3,220	3,692	4,148	4,568	5,199	5,597	5,647	5,647	5,647	5,647
GRAND TOTAL	766	2,666	5,455	6,430	6,538	7,709	9,252	11,440	10,450	7,812	6,657	5,937	5,862	5,872	5,692

Source: Office of the Utah State Planning Coordinator 1981.

<sup>a</sup>Uintah Basin Multi-County District and Rangely Census County Division. All numbers represent annual averages or mid-year estimates.<sup>b</sup>The operation work force estimates for the Central Utah Project are currently being revised.



## CHAPTER 5

# CONSULTATION AND COORDINATION

### PREPARATION OF THE FINAL EIS

The White River Dam Draft Environmental Impact Statement (EIS) was prepared through a contract with BIO/WEST, Inc. This Final EIS is based on the Draft EIS and reflects changes resulting from applicant modification and refinement of the proposal. Changes resulting from comments received on the Draft EIS from private individuals or groups and local, State, and Federal government agencies are included. The US Fish and Wildlife Service (FWS) official Biological Opinion identifying impacts to the endangered Colorado squawfish, an important issue affecting the choice of the agency-preferred alternative, is also included in this Final EIS (Appendix 4).

Table 5-1 lists the Bureau of Land Management (BLM) personnel (with their project assignment, education, and total years of professional experience) responsible for preparation of the Final EIS. The table also includes BIO/WEST, Inc. personnel responsible for preparation of the Draft EIS.

### AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE FINAL EIS WILL BE SENT

Comments have been requested from many agencies, organizations, and individuals including the following:

#### Federal Agencies

##### Department of Agriculture

- Agricultural Stabilization and Conservation Service
- Forest Service
- Soil Conservation Service

##### Department of the Interior

- Geological Survey
- Fish and Wildlife Service
- Bureau of Indian Affairs
- Bureau of Mines
- Bureau of Reclamation
- Heritage Conservation and Recreation Service
- National Park Service
- Office of the Solicitor
- Department of Commerce
- Advisory Council on Historic Preservation
- Environmental Protection Agency

#### State Agencies

##### State of Utah

- Clearing House
- Department of Natural Resources
- Division of Water Resources
- Division of Wildlife Resources
- Division of Lands
- Division of Oil, Gas, and Mining
- University of Utah
- Utah State University
- State of Colorado
- Clearing House

#### Local Agencies

- Utah County Commissioners
- Utah Basin Energy Planning Council
- Utah Water Conservancy District
- Ute Indian Tribe

#### Nongovernment Organizations

- Audubon Society
- Brigham Young University
- Common Cause
- Council on Utah Resources
- Defenders of the Outdoor Heritage
- Defenders of Wildlife
- Friends of the Earth
- League of Women Voters
- National Council of Public Land Users
- National Parks and Recreation Association
- National Stock Grower's Association
- National Wildlife Federation
- Natural Resources Defense Council
- Pro-Utah Inc.
- Public Lands Council
- Save Our Canyons Committee
- Sierra Club
- Society for Range Management

TABLE 5-1  
LIST OF PREPARERS

Individual	Project Assignment	Education	Total Years of Professional Experience
<u>BLM</u>			
DEE RITCHIE	Project Leader.	M.S. Range, Forestry, and Wildlife Management.	BLM 4 years, FS 18 years.
FERRIS CLEGG	Technical Coordinator, Aquatic Biology.	M.A. Biological Science.	19 years.
THOM SLATER	Utah State Office Coordinator and Quality Review.	M.S. Landscape Architecture and Environmental Planning.	20 years.
CURTIS TUCKER	Vernal District Office Coordinator.	B.S. Forest Recreation.	12 years.
ELAINE TORGERSON	Writer-Editor.	A.D. Business.	6 years.
MIKE BROWN	Writer-Editor.	B.A. History.	6 years.
SHIRLEY TAFT	Wordprocessor.		11 years.
L. LARELL CHAPPELL	Soils and Hydrology.	B.S. Agronomy.	15 years.
CRAIG HARMON	Archaeology and Paleontology.	M.A. Anthropology.	11 years.
MARK GREEN	Climate and Air Quality.	M.S. Meteorology.	4 years.
WAYNE KAMMERER	Visual Resources.	M.S. Forestry, Ed.M.	14 years.
DUANE DE PAEPE	Geography.	M.A. Geography.	15 years.
BERT LOWRY	Terrestrial Wildlife.	B.S. Zoology.	15 years.
DAVID HILLIER	Human Resources and Economics.	B.A. Economics.	7 years.
ROGER TWITCHELL	Vegetation.	B.S. Botany.	4 years.
BOB JENSEN	Wildlife and Range Management.		39 years.
LARRY ENGLAND	Threatened, Endangered, Sensitive Plant Species.	M.S. Botany.	7 years.
DAVE MOORE	Watershed.	B.S. Soil and Watershed.	16 years.

TABLE 5-1 (continued)

Individual	Project Assignment	Education	Total Years of Professional Experience
BIO/WEST, INC.			
PAUL B. HOLDEN	Project Manager and Aquatic Biology.	Ph.D. Ecology.	14 years.
MICHAEL H. ALBEE	Assistant Project Manager.	M.S. Wildlife.	6 years.
LOREN ANDERSON	Engineering Team Ph.D.	Civil Engineering. Leader.	15 years.
JOHN YOUNG	Geology.	Ph.D. Geology.	30 years.
CHAD HUNSAKER	Engineering.	M.S. Engineering.	3 years.
VINCENT A LAMARRA	Limnology.	Ph.D. Limnology.	11 years.
THOMAS M. TWEDT	Water Resources Team Leader.	Ph.D. Water Resources.	7 years.
WILLIAM J. GRENNEY	Water Resources.	Ph.D. Civil and Environmental Engineering.	13 years.
RICHARD H. HAWKINS	Hydrology.	Ph.D. Hydrology.	21 years.
PAUL R. NICKENS	Cultural Resources.	Ph.D. Anthropology.	11 years.
CHRIS CALL	Vegetation and Soils.	M.S. Horticulture.	6 years.
JERRY BARKER	Vegetation and Soils.	M.S. Range.	4 years.
STANDLEY L. WELSH	Threatened, Endangered, and Sensitive Plant Species.	Ph.D. Botany.	20 years.
ELIZABETH NEESE	Threatened, Endangered, and Sensitive Plant Species.	Ph.D. Botany.	12 years.
MICHAEL J. DALTON	Recreation and Visual Resources.	M.S. Outdoor Recreation.	10 years.
C. VAL GRANT	Wildlife Team Leader.	Ph.D. Animal Behavior.	17 years.
PETER KUNG	Wildlife.	B.S. Wildlife.	8 years.

TABLE 5-1 (concluded)

Individual	Project Assignment	Education	Total Years of Professional Experience
PETER A. BEEDLOW	Wildlife.	Ph.D. Biology.	8 years.
JOHN G. CARTER	Wildlife.	Ph.D. Biology/Ecology.	6 years.
JOHN KEITH	Human Resources.	Ph.D. Economics.	12 years.
WADE E. MILLER	Paleontology Team Leader.	Ph.D. Paleontology.	20 years.
SAM WEBB	Paleontology.	B.S. Paleontology.	2 years.
KATHLEEN HOLMES	Quality Control.	M.S. Outdoor Recreation.	4 years.
GERALD HUGHES	Cartography.	B.S. Geography.	5 years.
SCOTT GREENWOOD	Cover Drawings and Simulations.		10 years.
JOAN K SHAW	Editor.	M.A. English.	10 years.
NANCY HUBBARD	Typist.		15 years.

## CONSULTATION AND COORDINATION

The Wilderness Society  
The Wildlife Society  
Utah Cattlemen's Association  
Utah Council, Trout Unlimited  
Utah Farm Bureau  
Utah Sportsmen Association  
Utah Archaeological Society  
Utah Gem and Mineral Society  
Utah Water Pollution Control Association  
Utah Wilderness Association  
Utah Wildlife and Outdoor Recreation Federation  
Utah Wool Growers' Association  
Wild and Scenic Rivers

### Congressional

Utah Delegation

### Interested Individuals

Copies of this Final EIS will be available for public inspection at the BLM offices listed below:

#### Washington Office of Public Affairs

18th and C Street, N.W.  
Washington, D.C. 20240

#### Utah State Office

University Club Building  
136 East South Temple  
Salt Lake City, Utah 84111  
Phone: (801) 524-4227

#### Vernal District Office

170 South 5th East  
Vernal, Utah 84078  
Phone: (801) 789-1362

#### Richfield District Office

150 East 900 North  
Richfield, Utah 84701  
Phone: (801) 896-8221

## CONSULTATION AND COORDINATION

The Draft EIS was filed with EPA and made available to the public on November 26, 1980. February 10, 1981 was established as the deadline for submission of written comments. Public hearings were held January 7, 1981, at Salt Lake City, Utah; and January 8, 1981, at Vernal, Utah. Copies of the hearing transcript, along with the attendance list, are available for public review at the BLM offices in Salt Lake City and Vernal, Utah.

All written comments and oral testimony from the public hearings were reviewed for consideration in preparation of this Final EIS. Those comments that presented new data, questioned facts and/or analyses, and raised questions or issues bearing directly upon the Draft EIS were responded to in this Final EIS. Letters which were general or did not contain direct comments on the adequacy of EIS were reviewed but no response was made. On March 2, 1982, copies of the FWS Biological Opinion were made available for public review and comment. Comments received are included as part of Appendix 4.

Substantive comments received too late for inclusion and response in this Final EIS will be answered individually by mail. The late comments and responses, as well as all comments contained herein, will become a part of the project file maintained in the BLM Vernal and Richfield District Offices located at Vernal and Richfield, Utah, and will be given consideration along with the EIS during the decision-making process.

Federal decisions on this project will not be made until at least 30 days after the Environmental Protection Agency (EPA) Final EIS Notice of Availability has appeared in the *Federal Register*. During that 30-day period, written comments on the Final EIS may be submitted to be considered in the decision process.

Oral and written comments received on the Draft EIS are listed on the next page. Following this listing is a copy of substantive comments made at public hearings and all comment letters received. Responses to the comments appear after the respective oral testimony or comment letter.

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## PUBLIC HEARING COMMENTS

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#### Comment 1: Jim Godlove

"...Some of the concerns which should be addressed include the economic loss associated with the withdrawal of mineral resources from development due to lack of reliable water supplies. These mineral resources include valuable deposits of oil shale, tar sands, and coal, plus other non-fuel minerals. This loss of energy resource would far exceed the relatively small amount of resource which may be lost due to reservoir inundation."

Response: Coal is not an area resource that would benefit from the White River Dam Project. If the White River Dam were not constructed, it would not necessarily cause the economic loss of these energy and non-fuel mineral resources. A delay in this project could cause mineral/energy corporations to develop alternative water supplies such as currently owned surface water rights, purchase of additional surface rights if available, development of limited and poor quality groundwater, etc.

#### Comment 2: Jim Godlove

"...Other concerns would be the effect such loss of resource would have on our nation's goal of energy independence and our long-term national security."

Response: It is recognized that these mineral resources constitute a valuable, potential energy resource to our nation. However, the White River Dam is only one alternative for supplying a reliable source of water for this development.

#### Comment 3: Jim Godlove

"...The Final EIS should consider the air quality effects associated with each alternative's energy balance."

Response: The amount of air pollution from a coal-fired power plant required to generate the quantities of energy listed in Table 4-12 (Table 4-13 in this Final EIS) was calculated. Emission rates listed in the PSD permit for the Bonanza Power Plant were used. The results are shown in the table below.

Equivalent Emission Rates From  
a Coal-Fired Power Plant Corresponding  
to the Net Energy Analysis (Supplement to Table 4-13)

Alternatives	Construction for 2-Year Period (tons)			Operation for 80 or More Years (tons/year)		
	TSP	SO <sub>2</sub>	NO <sub>x</sub>	TSP	SO <sub>2</sub>	NO <sub>x</sub>
Alternative 1	34	59	629	-4.4 <sup>a</sup>	-7.6 <sup>a</sup>	-81 <sup>a</sup>
Alternative 2	0	0	0	0	0	0
Alternative 3	34	58	623	0.56	0.96	10
Alternative 4	182	314	3,342	22.0	37.0	395
Alternative 5	106	183	1,948	5.3	9.0	96

<sup>a</sup>Negative emission rates appear for this case because the power produced from the hydroelectric generating plant would slightly decrease the need of coal-generated power, thus slightly decreasing emissions from burning coal.

#### Comment 4: Jim Godlove

"...According to the Draft EIS, the fate of the White River Dam depends upon the results of the biological assessment being conducted by the U.S. Fish and Wildlife Service. A central objective of the study is the characterization of critical habitat for the Colorado squawfish in the Upper Colorado River, both principally in the White River. It is our understanding that this important study of the White River has not begun in earnest due in part to funding limitations. Further, biological consultants to White River Shale Project are concerned that the suggested study may not produce conclusive evidence of squawfish habitat needs. The BLM should make certain that the required biological studies will be completed in both a timely and thorough manner to prevent further delay in finalizing the impact statement."

Response: Funding for the White River research was granted, and the studies were conducted. The FWS Biological Opinion is included as Appendix 4 in this Final EIS.

#### Comment 5: Jim Godlove

"...Throughout the Draft EIS references are made to the loss of wildlife due to both the inundation of riparian habitat by the reservoir and the alteration of habitat below the dam. It is not accurate, in our opinion, to correlate loss of habitat to the deaths of wildlife. Certainly, the more mobile species will simply relocate to more suitable areas along the river above and below the reservoir. The Final EIS should more thoroughly analyze the net impact of the reservoir on wildlife in the area and place in perspective the amount of habitat affected relative to the availability and usefulness of nearby alternative habitat."

Response: Some individuals of certain wildlife species could relocate but, for the most part, the number of species or individuals of a species that can occupy a given area is dictated by the available habitat. The elimination of a given amount of habitat does not immediately correlate with a loss of all the species within that habitat. However, those species usually are lost to predators or starvation or they become nonbreeding members of a population because of territoriality. Mitigating measures would offset some of the losses.

#### Comment 6: J. W. Reinher

"...Draft environmental impact statement does not provide sufficient information to allow one to make a rational judgment of the need for construction of this dam."

"The White River unfortunately is an interstate river with a large number of potential dam sites. Each dam site may be viewed from a number of perspectives including recreational value of the associated reservoir, storage capacity, water quality, wildlife impacts, impacts on river running, ability to develop water to specific plant locations without expensive pumping costs, ability to serve municipal water needs, flood control, ability to serve agricultural users, reservoir lifetime, effects on cold-water fisheries, and impacts on endangered species. Yet, in the Draft EIS we are presented with a single on-stream storage site. No consideration is given to the other potential dam sites on the White; no explanation is offered for their rejection."

"In fact, what is needed is a complete master plan for water use in the White River Basin. Such a plan should select appropriate dam sites and the timing of their utilization in such a way that all these various values are

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given optimum consideration. If all of the potential dam sites have both defects and virtues, as one would expect, then the public should be presented with that information and allowed to express opinions on what constitutes the best trade-off among these possible benefits."

**Response:** The Draft EIS was in response to the Utah Board of Water Resources' proposal to construct a dam on the White River. Utah's proposal for the dam site was based on the engineering analysis of the best location to construct a dam in Utah. See Letter Response 25.2 and Figure 2-2 in this Final EIS.

As you point out in your comment, several other dam sites exist along the river in Utah and Colorado; the other sites investigated were rejected because of engineering feasibility recommendations. Several of these sites were noted and discussed on page 10 of the Draft EIS.

Utah is faced with an immediate need for White River water, based on energy development in the area. The White River Dam is only one way to satisfy that immediate need. The EIS does give an array of alternatives to satisfy the immediate need for water in the area so that the decision-makers have the information available to help determine the best way or combination of ways (alternatives) that might constitute the best course of action at this time.

**Comment 7:** J. W. Reinherr

"...Further, the Draft EIS does not convincingly demonstrate that the time is at hand when we must make a decision on the fate of the White River. The future is still uncertain, but the future will determine which of the above considerations is most important. For instance, if oil shale proves to be an impractical source of oil, then agricultural water will remain the most important water use on the White. If insitu production of oil is most efficient, then an expanded need for municipal water will be the major water need. If the oil shale industry grows explosively, then the entire flow of the White River will be consumed and pipelines to the Green River will be needed. The White River will need to serve its water users divided between those which should be served from the Green and the higher elevation users who should be served from the White. With explosive growth, development of recreation areas and protection of wildlife will become more important. Dr. perhaps faced with explosive growth, the farmers along the White would prefer to sell their land to subdividers and their water to industry and depart for new lands. But whatever the future, we do not have sufficient information to determine if this site can most flexibly respond to the needs of the future."

**Response:** The EIS is intended to be an objective analysis of environmental impacts. It is not intended to cover all matters which may influence decisions regarding the proposed White River Dam.

During the preparation of the environmental impact statement, efforts were made to identify and analyze the environmental consequences should the White River Dam or one of the alternative projects be constructed. The authority to allocate and appropriate water to any of the potential uses rests with the State Engineer who represents the State of Utah.

**Comment 8:** J. W. Reinherr

"...Other questions remain unanswered in the Draft EIS. First, the Draft EIS notes that in 52 years the dam will no longer be able to meet its water supply goals due to siltation. In 82 years the 100,000-acre-foot White River Dam will be completely filled with silt. We are creating an environmental

tragedy for future generations. The Draft EIS does not deal with the environmental consequences of this end-stage condition."

**Response:** Based on the projections, assumptions, and analysis for the proposed White River Dam and Reservoir, the active life of the reservoir would be approximately 52 years and would probably be completely filled with sediment in 86 years. Should the dam be constructed, this fact is one that would be accepted as one of the trade-offs for water development of the White River and would be one of the unavoidable adverse impacts. See Letter Response 4.10.

**Comment 9:** J. W. Reinherr

"...Second, in discussing the White River Reservoir, the Draft EIS notes that due to turbidity, eutrophic conditions of oxygen depletion the lake will not be able to support a cold-water fishery and will be at best a poor warm-water fishery. Perhaps they say it might be useful for boating, but then the EIS states that because of algae bloom and hydrogen sulfide odors, boaters might prefer other lakes. The pattern of silt accumulation and its effects upon recreation is not discussed. Much like a candle burning at both ends, reservoirs fill with silt from the dam up and the inflow down. What will be the impacts of these rapidly expanding mudbanks?"

**Response:** Initially, the majority of the suspended sediment load would be deposited near the reservoir inlet forming a delta. Its formation would be influenced by variance in the reservoir level and volume of flow in the river. On upstream portions of the delta, vegetation growth could establish if the reservoir didn't fill to capacity for a few years in succession. After the reservoir level raised, such vegetation could slow water flow and result in sediment deposition further upstream. If the vegetation were inundated for a prolonged period, it would decompose possibly causing some degradation of water quality (Ortolano, 1973).

Under normal operating conditions, the water level fluctuation caused by inflows and drawdowns would alternately inundate and expose 9 vertical feet of the delta and the banks of the reservoir. The exposed areas would be subject to erosion from high winds, rainfall, and wave action. Eventually, wave cut terraces could form along the banks with the eroded material creating shoals near the shore. These exposed areas or mudbanks, visible when drawdown occurred, would be unattractive and interfere with the quality of recreational experiences that could be provided, especially with regard to shore-based activities (Ortolano, 1973).

**Comment 10:** J. W. Reinherr

"...Third, the streamflow levels below the dam are not spelled out. It is stated that a hydropower facility will be placed on the dam. But it is not stated whether this facility will be operated as a baseload or a peaking power station. This requires further clarification. Will there be interim operating criterion until the water is needed by industry? What are the minimum flows that will be maintained below the dam and below major points of diversion? What commitments will be made on streamflow, and how will these be enforced?"

**Response:** Appendix 3, page 163 of the Draft EIS, discusses streamflow levels below the dam and states that the proposed power plant would produce power from releases from the dam. This would be baseload power. The minimum releases below the dam would be 250 cfs. See Appendices 3 and 4 of this Final

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EIS for new streamflow levels below the dam. These levels are proposed for dam operations after depletions are made by industry, based on the past 50 years of record. However, these records do not presume to guarantee anything not provided by nature. Emergency operations of the reservoir could require a minimum flow lower than that anticipated for short periods of time.

The agreement (not yet ratified) between the State of Utah and the Ute Indians concerning water rights on the White River would allocate and provide for delivery of water at a diversion point within the Indian Reservation. The quantities of water could be diverted from the river for use on the Reservation provided the natural river flows equal or exceed the amounts indicated in Appendices 3 and 4 of this Final EIS. The commitment and enforcement of minimum flows would be handled according to present policies of the Utah Division of Water Rights. The State Engineer has enforcement and management authority for water rights in the State of Utah with the exception of Indian water rights.

**Comment 11:** J. W. Reinher

"...Fourth, it is considered that below the reservoir the White River will become clear and silt-free, that all turbidity will settle out in the reservoir. In fact, many dams simply store silty water and release it all year long. Water clarity is a major environmental variable which will determine which species of fish will exist below the dam. The Draft EIS does not consider this issue in detail."

**Response:** To clarify the point about all turbidity settling out in the reservoir, please review page 100 of the Draft EIS. The trap efficiency of the reservoir, based on soil types and present water quality, is about 94 percent, applying present state-of-the-art techniques. This means that 6 percent of the sediments would continue downstream. This information was used to analyze impacts to aquatic wildlife in the White River. Water clarity was closely considered in association with turbidity in the Draft EIS. This subject is also included in this Final EIS.

**Comment 12:** J. W. Reinher

"...Finally, the dam, its storage rights, and the direct-flow rights will all be owned by the Utah Board of Water Resources. Water presumably will be rented to oil shale companies, but the actual water rights will not be given to them. How will this rental fee be determined? In the legislative act that created the water bonding fronts, it was only stated that, taken as a group, the proposed dams must be a cost-benefit ratio greater than one. Does this mean that the cost of these other dams will be added into the fees charged the oil shale companies? Does any organization have legal authority to ensure that this rental fee is fairly established? How exactly will this fee be calculated?"

**Response:** You are correct: the dam and storage rights would be owned by the Utah Board of Water Resources. The water would be sold under contractual arrangements with oil shale development companies and others. The water rights would remain with the Board. The question regarding rental fees has not been completely worked out, but the Board would determine the fee charged for water. The fee would be based on operation and maintenance costs of the dam and reservoir, costs of construction, and interest rates of money borrowed or bonded. A price per acre-foot would be established based on a fair market value for industrial water and other uses. The legal authority to ensure that the rental fee is fairly established is the Utah Board of Water Resources.

The Utah Board of Water Resources does not intend to subsidize the industrial use of water and it would be allocated on a first-come, first-serve basis. It is estimated that, under present-day values, the dam and reservoir project would be paid off in 19 to 20 years.

**Comment 13:** Peter Hovings

"...One of the things that was most conspicuous in its absence in the impact statement was there was no herpetology data. I'm not quite sure if it would be useful to know about some snake dens and things like that that would be in the area...."

**Response:** Reptiles were not considered an issue in the scoping meetings, but are part of the existing environment. Six species of lizards and six species of snakes have been commonly observed, and the milk snake was observed only once. Lizards are an important part of the vertebrate population in terms of numbers and energy transfer. Snakes are as important as lizards in the food chain in terms of overall significance; however, lizards provide more food because of larger populations. Snakes are more numerous in the project area as compared to similar regions of the West. This indicates a generally high faunal productivity.

### Lizards

1. Tree lizard
2. Short-horned lizard
3. Western whiptail lizard
4. Northern side-blotched lizard
5. Northern plateau lizard
6. Northern sagebrush lizard

### Snakes

1. Wandersnake
2. Western yellow-bellied racer
3. Desert striped whipsnake
4. Great Basin gopher snake
5. Midget faded rattlesnake
6. Milk snake

**Comment 14:** Peter Hovings

"...Then, someone asked about the use of the river. We can have it for oil shale. We can have it for the Desert generating facility. The Ute Indians could have it. However, the uses, the river wouldn't supply enough water for the Utes. Tosco is asking for 18,000 acre-feet of water; Moon Lake, 18,000; White River Oil Shale, 26,000; evaporation, 5,000. The Ute Indians, I believe, are asking for 27,000 acres. This adds up to 94,000 acre-feet of water, and the active capacity is 70,000. So, already water is oversupplied."

**Response:** It is true that the potential uses of water from the White River Reservoir could require more than is available. The Ute Indian Tribe probably has senior water rights under the Winters Doctrine and would, therefore, have a supply potential to irrigate 12,833 acres of land. The Utah Division of Water Rights (State Engineer) has enforcement and management authority for water rights in the State of Utah with the exception of Indian water rights. Water for energy development would be allocated by the Utah Board of Water Resources under their water right on a "first-come, first-serve basis". Since the printing of the Draft EIS, Moon Lake (now called Bonanza Power Plant) water requests have been eliminated. These and other changes would have to be dealt with on a case-by-case basis.

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Comment 15: Peter Hovings

"...None of the alternatives actually figure into the structure of the project. It's a convenience. So, I can conclude from this that the dam would be a very wasteful place for us to get the water. And my impression is certainly Tosco would have to pump it, the Utes would have to pump it, Desert generating station would still have to pump the water. And I'm not sure in the energy balance here whether that cost of pumping the water from the reservoir was actually included. I'm not sure here. I couldn't find it, but that does not mean it's not there."

Response: The only pumping costs considered in the analysis were those associated with Alternative 3 (pumping from the White River into the proposed Hell's Hole Reservoir), Alternative 4 (pumping water from the Green River [near Walker Hollow] to the vicinity of the proposed White River Dam site), and Alternative 5 (supplemental water pumped from the Green River [augmenting White River water]). These costs (see Appendices 5 and 6) provide a basis for cost comparison of alternative methods of supplying water in the area of the proposed dam. From there the water would be conveyed to user locations, be they oil shale or generating plants.

Generalized estimates of dollar cost indicate that water costs would probably not be more than 2 or 3 percent of the costs of constructing and operating oil shale plants (Colorado Department of Natural Resources, 1979).

The EIS now being prepared for seven synfuels projects in the Uinta Basin will include a net energy analysis for those projects. Six of these projects propose to use White River water (see Table 1-1).

Comment 16: Ken Sleight

"...There should be more study regarding the cumulative effects in combination to the existing dams and the projects, namely the Flaming Gorge and Glen Canyon Dams. There should be further study to the cumulative effects of the other proposed projects, namely the Central Utah Project on the Duchesne River, the Moon Lake Project, the Juniper Cross Mountain Dam crossing, and the Cheyenne Water Supply Project. There is at times insufficient water flow because of the dams to conduct normal-type trips; for instance, because of the Flaming Gorge Dam the low level caused by that dam is detrimental to boating operation in Dinosaur National Monument. Should the White River Project hold water back at the precise time as Flaming Gorge we would be in serious trouble. The situation is even now serious. It affects us in Desolation Canyon and in Cataract Canyon of Canyonlands National Park."

"May I add this to what happened down below the Glen Canyon Dam a couple of years ago. They held the waters back in the Glen Canyon Dam and a number of the outfits went high and dry on the rocks, could not get out. They had to helicopter the entire parties out, the bodies and all the equipment, because of the lack of water."

Response: The Final EIS incorporates each of the projects you reference in the discussion of cumulative impacts. The discussion of effects on river running and canoeing have also been expanded in this Final EIS. See the revised Recreation sections of Chapters 3 and 4.

Comment 17: Ken Sleight

"...There has been no detailed study regarding the minimum flow needed to preserve a viable river-running industry and the boating public. This was available to the study. It didn't seem fit to inquire of the Western River

Guides Association, and I think they could aid the study further before the Final EIS."

Response: Mr. Patrick Conley, President of the Western River Guides Association, was contacted regarding flows required for river running on the Green River. He estimated that the minimum flow necessary for viable operations through Desolation Canyon is 4,000 cfs. If flows are below that level, rapids may be impassable for large rafts and difficult for motorized rafts; also, the float between rapids would be slow.

The Price River Resource Area, responsible for management of the Desolation Canyon section of the Green River, estimated that the minimum flow necessary for rafting is approximately 3,000 cfs. While flows this low will accommodate rafting operations, the trip can be hard on equipment. Flows this low were recorded during the summer of 1977, as reflected in Table 4-3. During that summer, nearly all trips scheduled by commercial operators were conducted. There were several cancellations by private parties, however, due to the low flows.

If the White River Dam had been in place during 1977, proposed depletions would have been less than 5 percent of the flows recorded through Desolation Canyon. With the proposed dam operating policy, there would not have been any flow depletions during July, August, or September. In July, flows would have been augmented by 81 cfs.

Therefore, it is concluded that flows diverted by the proposed project would not significantly affect river-running operations through Desolation Canyon even during drought years.

The proposed depletions could have adversely affected any rafting and canoeing on the White River during April, May, and June of 1977 when flows were already below normal by as much as 75 percent (reference Table 4-3). As noted in this EIS, there is presently a small, but growing rafting and canoeing use of the White River.

Comment 18: Ken Sleight

"...Its been stated in the study, page 142, that the flows diverted from the White River would themselves have little impact on commercial and private river running. This is entirely false. It will have a major impact. I refute the statement as made in the study."

Response: Please see the previous Response 17.

Comment 19: Ken Sleight

"...Details as to the impact of that project upon the entire Colorado River Basin must be given. It's going to have great impact all the way to Mexico, make no doubt about that."

Response: It is assumed that the comment makes reference to future reductions in river flows. These changes, according to Mr. Sleight, could significantly modify and reduce the quality of the recreational experiences of river runners whether they be commercial expeditions or private float trips.

Projections of normal water depletions under various project alternatives and worst case depletions by project alternatives during the driest period of record for the White and Green Rivers are provided in Tables 4-2 and 4-3. It is noted that reductions in the Green River flows would vary between 1-3 percent if the White River Dam Project could decrease water flows in the Green River near Green River, Utah by 4.2 percent.

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The consequences of water depletions from the White River in Utah are insignificant when flows enter the Colorado River which is soon joined by the San Juan River before entering Lake Powell.

Water released from Lake Powell reflects the arrangements of compacts between the states within the Upper Colorado River Basin and Lower Colorado River.

Cumulative impacts, both anticipated and historic changes, are important from many aspects, including the effects of reduced flows on recreational experiences of river runners. Although the impacts are difficult to quantify, it is recognized in the Cumulative Impacts section of this Final EIS that cumulative flow reductions could eventually shorten the season and numbers of river-running trips.

**Comment 20:** Richard W. Dougherty

"...I have canoed the river and visited the surrounding area on several occasions. In that regard, I might state that the EIS is not wholly accurate in describing canoeing as occurring only in late spring and early summer. I personally led a canoe trip on the 14th of July 1979, and know of another which ran the river on Labor Day weekend of 1980. In other words, the river is canoeable all summer long during a reasonably wet year.

"I stress this because free-flowing rivers suitable for novice-level canoeing are scarce in the State of Utah. White-water rafting on larger rivers such as the Green and Colorado is increasingly subject to regulation by the BLM and the National Park Service. As population pressures increase in a state whose population is already 85 percent urban, the recreational value of a wild river such as the White is bound to increase. The Utah Division of Water Resources has consistently ignored this fact. The BLM Draft EIS, while acknowledging it, does not give it the attention it deserves."

**Response:** The intent of the paragraph on canoeing and rafting (page 69 of the Draft EIS) was to convey the frequency and time distribution of the activity. As indicated, some of the activity is hunting related and therefore takes place during the fall. It is recognized that some canoeing and rafting takes place during other seasons, depending on weather conditions and the volume of flow in the river.

The recreational value of rivers, such as the White, is increasing. There has been a significant growth in canoeing and rafting during the past decade. The increased use resulted in settling use limits in the more popular areas. As this was done, use of the smaller, less popular rivers has increased, thereby increasing their recreational value for canoeing and rafting.

Meanwhile, participation in other water-related activities such as fishing and boating also increased. While construction of the White River Dam would decrease wild-river canoeing and rafting opportunities, it could increase other water-related recreational opportunities. However, this Final EIS indicates that the fisheries and boating environment created by the White River Dam could be of low quality. These factors indicate that the future recreational value of the White River could be degraded if the dam were constructed. See the revised Recreation section of Chapter 4 in this Final EIS.

**Comment 21:** Richard W. Dougherty

"...The BLM Draft EIS does address itself to the significant loss of wildlife habitat which would occur if the dam were to be built. Of course, the key question in this regard is the effect of the dam upon the habitat as well as that of the Colorado squawfish. In contrast to some individuals in

Utah, the Sierra Club feels that endangered species deserve protection, particularly against projects of such dubious economic feasibility."

**Response:** Effects of the dam upon fish habitat and especially the Colorado squawfish are important issues. Page 108 of the Draft EIS addressed the impacts of the White River Dam and Reservoir in three general areas: upstream from the reservoir, within the reservoir basin, and below the dam. Page 110 discussed the unavoidable adverse impacts and the negative impacts to the Colorado squawfish in the White River.

An extensive study of the White River has been conducted by the FWS. Data collected from this 1981 research was used by biologists to further analyze endangered species and their habitat. In addition, an official Biological Opinion from this governmental agency addresses impacts from the White River Dam on endangered species (see Appendix 4 in the Final EIS). It is the opinion of the FWS that, if the dam operating procedures and the conservation measures described in Appendix 4 were implemented, the White River Dam Project would not likely jeopardize the continued existence of the endangered fishes.

**Comment 22:** Frank Allen

"...Magic Circle's water requirements are not treated in the impact statement. It has, however, a longer history of involvement in Utah oil shale development in coordination with Federal energy agencies than any of the potential developers whose water needs are treated. It has held its oil shale leases since 1965."

**Response:** Magic Circle's oil shale water needs are now included in Chapter 1, Purpose and Need section of this EIS.

**Comment 23:** Frank Allen

"...The impact statement unwisely discounts, we believe, the significance of water cost in the economics of a synthetic fuel venture. No analyst suggests that an oil shale or tar sands plant will enjoy a comforting advantage over competing fuel sources, particularly DPEC sources. Water made available by any of the dam alternatives might well come at prohibitive cost.

"The impact statement reflects careful and even prodigious effort. Clearly the realization of the Basin's energy potential will entail severe ecological disturbance, institutional stress, and sacrifice of values associated with desert wilderness. We believe the national well-being requires some trade-off. We believe the planning of state and local levels has been perceptive and reflective in a community consensus. Mitigation programs must, of course, be implemented; but Uinta Basin will make no appreciable contribution to the relief of the nation's energy deficit unless its resources are mobilized with that predominant purpose."

**Response:** As the comparative analysis discussion in Chapter 2 points out, the most costly alternative would add approximately 6 cents to the cost of producing a barrel of oil. If shale oil sells for \$30 to \$40 per barrel, this would constitute only 0.2 percent or less of the price. Water costs, as a percent of the costs of production, would be similarly small (something less than 0.5 percent). While it is not implied that oil shale or tar sand plants would have an advantage over competing fuel sources, it does appear unlikely that increased costs of 6 cents per barrel would prohibit the economic production of shale oil.

## PUBLIC HEARING COMMENTS

### Comment 24: Lacey A. Harris

"...And again looking through the book very rapidly, unfortunately there has been no socioeconomic study for the Ute Tribe, no impact study on behalf of the Ute Tribe. As I said, we're losing a valuable commodity. There is, I realize, much energy in that area."

Response: It is uncertain whether the Ute Indian Tribe will want to significantly expand its agricultural output by bringing other irrigable lands into cultivation; hence, environmental impacts are not anticipated with reference to the proposed White River Dam Project and the Ute Indian Tribe. The Ute Tribe can use its Winters Doctrine water right with or without the White River Dam.

Construction of the White River Dam would require the employment of 20 to 50 workers for about 2 years. Some of these workers could come from the Ute Tribe. The socioeconomic impacts on communities in the Uinta Basin would be of short duration and so spread over time as to be negligible. It is noted, however, that if the White River Dam or alternatives were constructed at the same time as other energy-related projects, it would contribute to cumulative socioeconomic impacts in the region.

### Comment 25: Lacey A. Harris

"...I realize this is an important issue, but I also realize that sometimes we as Indian people are getting the wrong end of the stick. Our water rights are not being considered, our own mineral resources, our own energy resources are not being considered, and there are some of the concerns I have, and I hope that the committee will seriously look at and seriously take into consideration these problems, these issues that have yet to be looked at in their own study."

Response: It is noted on page 1 in the Draft EIS that "The Ute Indian Tribe of Fort Duchesne, Utah has prime water rights on the White River under the Winters Doctrine with a potential to irrigate 12,833 acres of land." Mineral-energy resources owned by the Ute Indian Tribe were not analyzed in this EIS because it was assumed that they would not be significantly impacted by the project proposal.

### Comment 26: Steve Bonnell

"...On page 31 there is a picture of an oil seep in the area that says, 'When the dam is constructed it will be capped.' To me it appears that this oil seep is in an alluvial area and the capping of such a seep would be somewhat difficult. And I believe some more investigation will also have to be done."

Response: See Letter Response 4.5.

### Comment 27: Steve Bonnell

"...Also, the geology of the area has quite a few joints which are shown in the gilsonite veins and this kind of stuff that are trending throughout the area. Now, these joints generally are - well, a lot of times are quite deep, and I believe would provide a water route for movement of water from the dam through there. Also, the encountered waters of the dam will contact several aquifers in the area, including aquifers immediately above and in contact with and immediately below the Mahogany oil shale formation. This presents a possibility of possible flooding when the dam is built."

Response: The Bird's Nest Aquifer would be recharged at a greater rate because of the reservoir impoundment. However, this recharge is estimated at less than 0.9 cfs for a 1-year period and is not considered a significant problem for oil shale mining (Bingham Engineering, 1981a). See also Letter Response 64.14.

### Comment 28: Robert N. Heistand

"...Although Paraho has access to an approved, privately owned water right of 4 cubic feet per second, about 3,000 acre-feet from the White River, its long-term plans for water anticipate purchase from the Utah Division of Water Resources, 6,000 acre-feet to be supplied from the White River. The execution of this right on water impounded by the White River Dam, although not creating any noticeable or serious impacts, should be included in future allocations for energy development in the Uinta Basin."

Response: The Paraho potential water use is included in this Final EIS. The water would, as stated, be sold to users on a first-come, first-serve basis and the water rights would remain in the State of Utah's name. In short, the Utah Division of Water Resources indicates that most of the future water needs for energy development in the Uinta Basin could be covered by the White River Dam Project depending on the nature of specific project needs, yearly arrangements, and technological refinements. The upcoming Uinta Basin Synfuels EIS will analyze specific project water needs in greater detail.

### Comment 29: Neal Dongard

"...This environmental issue [energy] is of regional and national significance, and is probably beyond the scope of requirements that this EIS was designed to address."

"The White River Dam Project is designed specifically to implement the production of energy for the purpose of supplementing one of a rapidly depleting source of energy on which the United States' transportation, defense, and economic systems rely."

Response: The production of synthetic fuels (synfuels) from oil shale has been recognized for several decades as a potential source of needed energy. Research and technological advances plus changing economic conditions have encouraged those who control oil shale tracts to accelerate efforts to process oil shale into usable and needed energy.

"We have recognized the national situation concerning the need for domestically produced synfuels. The environmental impact statement must also be concerned with other significant environmental impacts should the project or one of the alternatives be approved. Part of these consequences are identified with human or socioeconomic conditions, but also include impacts to other environmental components (i.e., water resources, vegetation, wildlife, land uses, cultural resources, threatened and endangered species, and other resources)."

### Comment 30: Neal Dongard

"I cannot help but wonder if some questionable habitat area in the lower White River would not actually be improved by the settling of silt out of the water in a reservoir above the dam. Even if it does not improve the habitat in that section of the river, is it worth the alternative environmental consequence?"

## PUBLIC HEARING COMMENTS

Response: The river habitat downstream from the dam would be impacted much as described in the Environmental Consequences section of this EIS. Additionally, silt reduction and water temperature changes have been addressed in the official FWS Biological Opinion (Appendix 4 of this Final EIS). It is the opinion of the FWS that a reduction in sediment yield would probably have a beneficial effect, at least on the suspected spawning area for the Colorado squawfish in the White River below the proposed dam site.

Comment 31: Neal Dongaard

"...One other regional, if not national environmental issue, that is not addressed in the Draft EIS is the long-term consequences that will certainly follow if the White River Dam is rejected because of the change of water-flow conditions in the lower White River.

"Such a decision could readily become a precedent preventing or delaying future water development projects for recreation, human needs, energy development, or other essential development in the tributaries of the Upper Colorado River Basin."

Response: We agree that important consequences could follow the selection of the No Action Alternative. These projections are discussed in Chapter 4, page 118 in the Draft EIS and also in Chapter 4 in this Final EIS.

Comment 32: L. Y. Siddoway

"...The Draft Environmental Statement recognizes that there is limited canoeing and rafting on the White River in Utah and estimates that there are fewer than 20 parties per year involved in this recreation. I believe this is an exaggerated recreation number, and that prior to the proposal of the White River Dam there were no recreationalists outside of hunters using this area."

Response: The Vernal District Office of the BLM, responsible for managing the public lands along the White River in Utah, indicates the estimated 20 canoeing and rafting parties per year (during recent years) would be the minimum number and the actual number probably is greater than that. While there are no formal records of the actual numbers of people floating the White River, personal observations and contacts provide a basis for estimation.

It is true that 6 to 8 years ago there was little, if any, rafting activity on the White River. However, there has been considerable growth in rafting and canoeing activity in the Upper Colorado River Basin during the past 10 years. As activity on the more popular rivers has increased to the point of crowding, quotas and permit systems have been established for the popular areas. As a result commercial and private operators have begun operating on other, less utilized rivers including the White River. This is verified by comments received from river guides expressing their concern with the possible impacts to canoeing and rafting on the White and Green Rivers. As a result of extensive publicity surrounding the White River Dam Project, recreational use would probably increase significantly. See the revised Canoeing and Rafting section under Recreation, Chapter 3 of this Final EIS.

Comment 33: L. Y. Siddoway

"...In reviewing the environmental statement regarding endangered species, I reach the conclusion that there is not sufficient evidence that would classify the White River as critical habitat for the three endangered species, although the Draft does state that these fish have been found in the White River.

"The Draft also indicates that the use of the White River could be 'seasonal or sporadic use of the White River."

"The conclusion that we have reached in our review of the Draft is that the benefits of the project far outweigh any damage to the environment and the project should immediately be approved by the Bureau of Land Management and the Department of Interior."

Response: At this time, the White River has not been officially designated as critical habitat. An extensive study was conducted by the FWS and funded by BLM to answer questions which were pending at the time the Draft EIS was prepared. The BLM is required by law to protect endangered species. The results of that study are included in this Final EIS in Chapters 3 and 4, Aquatic Wildlife sections, and also in Appendix 4.

Comment 34: Robert L. Heffner

"...However, my principal concern is that in this very excellent statement perhaps inadequate attention has been paid to the possibility mentioned by the first speaker tonight regarding the amount of recharge into formations adjoining the river and in the inundated area. I suggest that it would be worth considering its impact on subsequent mining operations, particularly the northern west and down a depth from those formations and a potential impact on pumping rights that might be increased at that time."

Response: Excessive groundwater recharge with consequent impact to mining operations has been summarized by the Utah Geological and Mineral Survey (Ritzma, 1980):

As to possible loss of water into mines from the reservoir, either into joints, aquifers, and bedding planes, we also agreed that there is a very definite problem present. However, the structure of the area - prevailing dip to west and northwest - will tend to minimize this problem in Tracts Ua and Ub but will make it a matter of much more concern west and northwest of the reservoir. In particular, the existence of the reservoir will virtually exclude the possibility of mining oil shale beneath the reservoir proper and in the areas between the major meanders such as sections 10 and 16, T 10 S., R 24 E. This means the fee tracts which were originally the subject of this investigation (as to their mineral value) should be considered as virtually unminable.

There was agreement that there will always be the possibility of leakage from the reservoir through various conduits into mining areas, even in Tracts Ua and Ub. The operators of these tracts seem confident that the problem can be handled and is not a barrier to development.

However, according to the USDI, Geological Survey (1981), mining under bodies of water is technologically possible and loss referred to by Ritzma may not be significant. See letter Responses 22.3, 27.4, 27.24, and 27.37.

## Comment Letter 1



INTERESTED IN SAVING SOUTHERN UTAH'S ENVIRONMENT

Vernal District Office, BLM  
170 South 500 East  
Vernal, UT. 84078

MOAB CHAPTER  
POST OFFICE BOX 884 963  
MOAB, UTAH 84052  
(801) 259-6700      4 December 1980

Sirs:

After review, we have the following comments to make on your Draft Environmental Impact Statement for the White River Dam Project:

- 1.1 We commend the agency for the research it has done, and agree with its preferred alternate of "NO ACTION." We recommend that this alternative be made the final one, regardless of what any "Biological Opinion" may conclude. It is simply not possible to change this much aquatic and riparian habitat without seriously affecting the life expectancies of the inhabitants, including the endangered species. Toolittle is presently known about the long-range effects on such species when their habitats are changed to this extent to know how to mitigate the effects.

We will appreciate receiving a copy of the final EIS.

F. A. Barnes, Executive Director  
IBSUE, Moab Chapter

## Response Letter 1

- 1.1 The views expressed will be considered in the decision-making process. When habitats are changed, most species are affected, some more seriously than others. Effects on threatened and endangered species are addressed in Appendix 4, FWS Biological Opinion, and in Appendix 10, FWS Technical Assistance Report, in this Final EIS.

## Comment Letter 2

THE NORWEGIAN SCHOOL OF NATURE LIFE

RED MOUNTAIN PASS, Colorado  
HEMSEDAL, Norway

Tom Commermeyer  
HPER 226 N  
Recreation & Park  
Management  
University of Utah  
SLC Utah 84112

17 December 1980

Dear District Manager:

2.1 Enclosed is a copy of the letter and "Story of the White River" and our strong feelings against the development of the proposed dam. As stated, we are not in need so much of new energy and more consumption, but a new way of life - less consumptive, less wasteful, less competitive - We must re-educate, or educate into this alternative life style.

For no longer can Earth or Man or all of Nature survive its greed - Especially when we see what happens to a project that

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in 50 years will be filled with silt - all of Nature lost forever, and then for what real, truthful reason... for consumption, exploitation, over-use??

I hope greatly that before a proposal of such is approved (if it does become) each one who sits in a chair who says "yes" in favor, will take the full blame for a Nature catastrophe, as if murder of fish, wildlife, vegetation etc.

Even if this is a trade off - who of man is truthfully able to decide the fate of what is to live, and what is to die - who gave us these "rights"??

I feel strong and hopeful that your office will make a true and wise decision -

Thank you for letting us give input into this proposal - from the Draft of White River Dam Project

Lovingly & Naturally  
Tom Commermeyer

# THE NORWEGIAN SCHOOL OF NATURE LIFE

## FROM:

Tom Gammelmeyer  
c/o HEM 2260  
recreation and park  
management  
University of Utah  
Salt Lake City, Utah  
84112

RED MOUNTAIN PASS, Colorado  
HEMSEDAL, Norway

30 July, 1960

Dear governor Scott H. Matheson:

My name is Tom Gammelmeyer and I am originally from Oslo, Norway. I am director of the newly formed Norwegian School of Nature Life here in the United States. The school's philosophy is that of the traditional form of Norwegian 'friluftsliv/nature life'--the unselfish and simple life in nature.

Through the school's own courses/seminars, we encounter nature by canoeing, kayaking, Nordic touring, and other related branches of 'friluftsliv/nature life' that will have a minimal effect upon nature; as we seek a more favorable 'quality of life' for all of nature, for which man is an equal part.

As we experience nature, in her 'freeness', we are striving to seek new alternatives for a life style, as we live it today, which is very egoistic, consumptive, and materialistic in values. This reaping of nature for man's own 'benefit' may be seen throughout the world in the more modern and industrialized countries, not only in the United States. As stated in the United Nations Environmental Program, YLLAC, "there is an urgent need for a new global ethic in education." Hence, it is through the philosophy and understanding of 'friluftsliv/nature life' that we offer one possible solution.

I have recently completed a master's degree at the University of Utah in Recreation and Park Management. In so doing, I was able to propose and develop, from Hemseidal, Norway, the philosophy of Norwegian 'friluftsliv/nature life', hence, forming the Norwegian School of Nature Life, once out of the San Juan Mountains in Colorado and various areas of Utah.

I have had the opportunity since January of this year to share and teach this alternative lifestyle not only through the Norwegian school, but also through courses offered through the Division of Continuing Education and Recreation and Park Management at the University of Utah. (Course title was Unselfish Life in Nature.)

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S.2

We have just recently (27-29 June) completed a course in "The Unselfish Life in Nature" touring in canoes as we floated down the White River, from Bonanza at Ignatio stage stop down to Mountain View bridge.

To have had this beautiful and unique experience and opportunity was both heart warming, and sad. Heart warming in knowing that there yet remains almost 'unspoiled and free nature'; and sad in knowing that this area may soon become another tragic victim to man, the 'conqueror and master' with a dam and reservoir.

In this particular course there was a total of ten of us that shared and felt a true feeling of sadness, fear, and disbelief that such a dam proposal is well underway. A dam, for which on this river or others in the state of Utah, or for that matter any where, that would soon eliminate and virtually destroy for eternity the tranquility and a quality of life that is so very limited and fragile. All of which is taken for granted and wasted by egocentric man in 'modern societies'. For what value is there in a dam, even in fifty years, when there remains nothing of the 'free nature' and a reservoir that has become filled with silt?

The demands and consumptive crave must stop, and no longer be allowed to continue at today's waste and methods by the capitalistic and selfish interests of individuals and industries. There must be a stop to this ever endless contagious disease of 'use and cast' life style or what remains of Planet Earth! At what point does modern man say "No More, enough is enough?" Can we not see what is happening and learn from past experiences (nuclear power, oil, pollution and other similar catastrophes)? There needs to be a 'new way of life' by all, in that we need not to constantly produce more and more of the limited natural resources and to know the marks of decay and death! What all of us MUST do is to limit our cravings and demands; stop the waste and overuse; "to reclaim the ways of old, to help make way for those of new." No longer can we prostitute the parts of oil, water, soils, natural life (including man). All of these natural resources and more, are in so-called "excess" because of the consumptive and greedy human population. We MUST begin to see the warning signals of a major global catastrophe if we do not change our ways now. To use the sun, ocean waves, winds, not for profit and commercialization by large capitalistic corporations to reap, and take from nature and their fellow humans and animals, but as a means to rejuvenate a decaying "modern way of life."

What we need is NOT more power, oil, mechanization, "advanced technology" and the like; but rather the ability of man to replace machines and computers, to use their

S.3

hands and minds. We have it much too easy, and all of Nature will pay because of Man's adapt ability to live in harmony on Planet Earth, not only with one's own species but other species as well.

Large corporations, industries, (hydro-electric power plants, oil, gas, etc.) continually encourages the use and demand of Nature's limited supply...Primarily for ones own selfish and materialistic gains; not for a more favorable quality of life for all of Nature. And then what happens in 50 years when the reservoir does become filled with silt, and there is no more oil shale, all of which has been reaped from the lands and consumed; do we then move on to the last of the remaining "free Nature" to exploit that area of its natural resources, where what life remains becomes even more threatened and dies forever? To seek out new resources and to "steal" from Nature the way "modern" societies do today, causing the same irreversible Nature crises as if it were a war against humans, is and will be unforlving! At the magnitude that we are exploiting Planet Earth this "war" may come to light as a major catastrophe for the "survival of the fittest"...and for what purpose?...to be a "winner or runner one?" Who cares, for all will have been lost in any case! This "war" would be of such great consequence and magnitude that all of Nature will suffer because of Man's "war crises".

Governor Matheson, I have spoken strongly here regarding a "life threatening situation" for all of Nature. But life needs not be so threatening. If we make good of our past experiences and the "warning signals;" for life on Planet Earth is a beautiful place for all, now and in the future! Hence, we must all begin to work as a PEOPLE in seeking a more favorable and lasting life style...to slow down...be less competitive and stressed...less wasteful and consumptive...use our hands and mind...be glad and find joy just to be a part of Nature, not apart from Nature...TO LIVE A ONE SIMPLE AND UNSELFISH WAY OF LIFE!

If only you could have experienced Nature with us on the White River (of which is only one of many areas to be concerned with in the United States and the world), you could see how your beautiful state is being life threatened. Hence, a dam is not the answer for this area or anywhere else.

What needs to be done instead is to divert and educate people towards a more favorable quality of life. (from hardwork and crafts to much less devastating forms of "soft" energy forms) And so Governor Matheson, I truly hope that you agree and react in such a way, that even for big business, the "return" is NOT justified morally or naturally!

S.4

A follow-up report from our encounter in Nature on the White River is now being finalized, and will be sent to you and others shortly. A copy of this letter will also be available to various interested individuals and groups. It is truly hoped by all of us involved, that you and your colleagues will understand, respond, and act as a "sincere equal part of the whole in Nature;" and that your favorable response in preventing any further degradation of Nature (as in the White River dam project) will ultimately enhance the quality of Life for all!

Your time, consideration, and action Governor Matheson will be highly valued and honored...

Thank you so very much!

Live long and naturally,

Tom Cammermeyer

# "Down to the Waterline"

John K. Johnson

A float trip on the White River of northeastern Utah is a trip down a remotely twisting lifeline, revealing the close harmony of river, rocks, wind, animals, trees, sand, and sun. The river arises about 150 miles to the east in the White River National Forest of Colorado. The mountain stream enters a wide and flat floodplain near Meeker, Colorado, and assumes the characteristics of a desert river ---- brown, silty, meandering, green Cottonwoods, blue sky, red rock, and numerous distant vistas. This is a perfect waterway for enjoyable canoe touring for the beginner and expert alike; a perfect place to view animal life and traces of older civilizations; a perfect place to escape and think of a simpler life and enjoy the natural beauty of life. May there always be another.

Our group consisted of ten people and we planned to cover the thirty mile section of the White River from just below Bonanza, Utah, to the Mountain Fuel Bridge, located about fifteen miles above the river's confluence with the Green River, near Ouray, Utah. Arriving at our put-in point at mid-afternoon on a Friday, we camped on a high ridge above the river. That evening we were treated to the first of several beautiful sunsets and moon rises, as the moon was to be full the next night. We slept to the sounds of owls just across the river in a grove of Cottonwoods, the moonlight outlining the bluffs and hills around us.

After an early breakfast the next day, we were waterborn at midmorning. The current of the mainstream channel and our

desire to see around each new bend made for effortless paddling. As we drifted along, it was hard to understand why the White River was removed from the Bureau of Outdoor Recreation's Wild and Scenic Rivers study list in 1975. The reason is simple to some people, it seems, but yet so very complicated to the total environment surrounding this vast area. A proposal has progressed for construction of a dam as a water source on the White for major oil shale development and "if and when oil shale proves no longer feasible, for future mineral resource developments in Utah." (4:1) According to Dorothy Harvey, founder of Citizens for a Responsible Central Utah Project, "wildlife biologists, and others who understand the significance of a warm water ecosystem in an arid land, have long had a deep concern about any dam on the river and the manner of its water use. It is a unique and fragile warm water river ecosystem in an area of stark, scenic beauty." (4:2)

It is interesting to note that a private oil shale developer working in the Bookcliffs area of eastern Utah requires for its process only the amount of water it can carry to the site in buckets! In addition, it has excess water to dispose of. Why then, does the State of Utah require 75% of the 500,000 acre feet of water in the White River for oil shale development? (2:16)

And so the war of water rages on in the mountain West. When will the onslaught of technology and development let the environment assume its natural regime? This is a question that must be given constant consideration and planning. The key issues of importance in the White River Project are outlined by Dorothy Harvey as being: 1) the importance, purpose,

and value of a river's annual flooding and our society's failure to establish the validity of a river as a functioning regime, 2) the conversion of the aquatic ecosystem of warm water rivers to cold water ecosystems, 3) the ultimate and undetermined ecosystem of a completely silted in reservoir due to high sediment concentration of the water, and 4) the failure of our society to restore a river's native integrity, and to recognize what biologists are saying are our most productive riverine ecosystems ---- those associated with warm waters.(2:36)

These issues can account for lengthy study and debate, but will be only briefly mentioned herein. According to Harvey, "it must be born in mind that the high degree of sedimentation taking place today in the White River is beneficial in creating and sustaining floodplains which are providential for wildlife. That same high sedimentation is a highly dubious factor in the life-span of any dam construction on the White River."(2:35) According to Paul Gillette, Assistant Director of the Water Resources Board, the size dam proposed is "expected to last at least fifty years" due to the high sediment load of the river water.(3:2) Impoundment, inundation, and the subsequent conversion of the aquatic ecosystem of warm water rivers to cold water ecosystems constitutes disruption of the total natural ecosystem in areas such as loss of habitat and disturbance of natural food chains for a myriad of wildlife species. Four species of endemic, warm water fish that are considered endangered species are

found in the White River. Over seventy species of birds reside in the summer along the White River, including such as the Peregrine Falcon and Golden Eagle.

Another issue of importance is the loss of the unique recreational opportunities along the White River. According to Peter Hovingh, Issues Committee chairman of Utah Nature Study Society, "in the past few years I have seen that the White River is perhaps the best beginning canoe river in Utah. There are others, but they are of low priority for one reason or another."(5:1) The river is floatable from March to November, but can be low and slow-moving in August and September. Peak flow in May and June may require some tricky maneuvering in only a few places along the river. The river has very high wildlife and scenic values. The riparian bottoms furnish a multitude of camping sites, and the desert shrub is accessible in several places for hiking into the nearby hills and craggy cliffs. However, "one thing is apparent in this second driest State of the Union, there is not any planning of water resources ---- just planning of water projects. Water resources also takes into account recreation, wildlife, and endangered species. Perhaps the State of Utah should concentrate on the preservation of its wildlife and scenic opportunities for recreational needs for the influx of new people from already present energy development."(5:2)

Another interesting aspect of this project is that the White River flows through Ute Tribal Homelands as it nears the

town of Ouray on the Green River. The Federal Administration Water Policy states the intentions and objectives for providing sufficient water on Reservation lands to fulfill Indian needs ---- a high priority right that dates to the time the Uintah and Ouray Reservation was established. According to Dorothy Harvey, the Utah Water Board maintains that the Ute Tribe is in agreement with development of the White River Dam and that their interests would be fulfilled, but in actuality, the Ute Tribe has not reached an official agreement or decision, or offered much support of the project. "Indians can be concerned that their own development interests will be short changed when non-Indian developments start." (4:2)

If only I were back on the river now. It would somehow be easier to explain; or the river and the country would alone explain the workings of thousands and thousands of years of natural co-existence in a simple but harsh landscape. Thousands of years reduced to a reservoir wasteland after fifty years of impounded silt. Can anyone be that greedy? Not if they spent a little time becoming acquainted with the river and the web of life that stretches along with it ---- natural, simple, rhythmic, sometimes tricky and unforgiving; not greedy. This is a pace of life mankind should learn from instead of destroying! Can we slow down enough to save ourselves and the environment? These were questions that plagued our group as we journeyed downstream and camped by the waters edge.

The cost of a thing is the amount of life required to be exchanged for it, immediately or in the long run. When one has obtained those essentials necessary for well-being, there is an alternative to struggling for the luxuries. Yet the mass of men, staking their meat at the crowded market put up with existences of quiet desparation ---- annoyed by their unnatural environments as if diseased. How sensible is it to spend all the best years of one's life earning money in order to enjoy a questionable liberty during later life? The truth is, Homo sapiens was bred for the tall forests and singing brooks. He was moulded for the wind rounded desert, the shadowy canyon, and a mountain top where the breeze blows free. Just the thought of the great beckoning rivers can cause the most civilized pulse to beat faster. An unseen animal crawling through shimmering grasslands, a lynx crouched in a sun-yellowed tree, and wolves howling beyond the fringes of a small bright campfire beside a lapping lake all have the power to make even the most carefully barbered nape hairs to prickle involuntarily. As civilization stretches what has been called its gentling influence more benevolently about this battered globe, it is disturbing to have to agree with our experts that in its ultimate aspects this carnage becomes more wholesale and ruinous. Better the instinct be more nearly answered as nature intended. We all need the tonic of natural wildness. That is why the day comes for even the more patient of us when a great lot of inanities begin making even less sense; the remorseless hurry to get nowhere in particular, the hopeless and yet always hopeful bustle, and the more deadly boredom of grimly assertive amusements for an unamused multitude. (6:1-3)

The White River is a place that has, so far, retained its natural wildness. the country is vast and, at midday, seems lifeless and too warm ---- great for a siesta. In the evenings, however, the land becomes alive and enchanting. "Panoramic views of the White River provide the most unique, contrasting, and diverse settings for individual perception

of aesthetic resources. The land/sky interface is sharp and such views constitute excellent observation points when searching for raptors, large mammals, and other wildlife of aesthetic interest. Color and form are the most dominant elements in these panoramas."(2:6a)

An avid wildlife observer would not be let down if floating along this lifeline that is the White River. Our group surprised several busy beavers and played hide-and-seek with a nervous crew of Canadian geese. A long-tailed weasel was sighted, as well as deer and Pronghorn antelope, and the quick and careful lizards. Large birds were abundant, including Great Blue herons, Horned owls, Red-tailed hawks, Golden eagles, and Marsh hawks. Seeing these animals instills thoughts of power, grace, naturalness, and true wildness in anyone; it makes one feel unimportant and small ---- and thoughtful about where one species' place is in the environment as opposed to another's.

We need another and a wiser and perhaps a more mystical concept of animals. Remote from universal nature, and living by complicated artifices, man in civilization surveys the creature through the glass of his knowledge and sees thereby a feather magnified and the whole image in distortion. We patronize them for their incompleteness, for their tragic fate of having taken form so far below ourselves. And therein we err, and greatly err. For the animal shall not be measured by man. In a world older and more complete than ours they move finished and complete, gifted with extensions of the senses we have lost or never attained, living by voices we shall never hear. They are not brethren, they are not underlings; they are other nations, caught with ourselves in the net of life and time, fellow prisoners of the splendour and travail of the earth. (1:1)

When will man again become a part of the community of earth that survived so well for thousands and thousands of years. Maybe the 1980's is a good time for the human race to take note and reevaluate its position in a world that will someday be natural again ---- with or without mankind. Ashes to ashes, dust to dust.

#### BIBLIOGRAPHY

1. Beston, Henry, The Outermost House, Ballantine Books, 1976.
2. Harvey, Dorothy, "An Environmental Impact Statement on the proposed White River Dam," November, 1979.
3. \_\_\_\_\_, Introduction letter to "An Environmental Impact Statement on the proposed White River Dam, November, 1979.
4. \_\_\_\_\_, Letter to Mrs. Ruby Black, Ute Indian Tribe, June, 1980.
5. Hoving, Peter, Letter to Governor Scott Matheson, Utah, June, 1980.
6. Whelen, Townsend, and Bradford Angier, On Your Own in the Wilderness, Gallahad Books, New York City, 1958.

## Response Letter 2

- 2.1 Thank you for the information. The views expressed will be considered in the decision-making process.

## Comment Letter 3

### Advisory Council On Historic Preservation

1522 K Street, NW  
Washington, DC 20005

Reply to:

Lake Plaza South, Suite 616  
44 Union Boulevard  
Lakewood, CO 80226

December 19, 1980

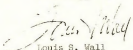
District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Dear Sir:

- 3.1 The Council has reviewed your draft environmental impact statement for White River Dam Project in Uintah County, Utah, circulated for comment pursuant to Section 102(2)(c) of the National Environmental Policy Act. We note that the undertaking will affect numerous cultural properties, eligible for inclusion in the National Register of Historic Places. Circulation of a draft environmental impact statement, however, does not fulfill your agency's responsibilities under Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320).

Prior to the approval of the expenditure of any Federal funds or prior to the granting of any license, permit, or other approval for an undertaking, Federal agencies must afford the Council an opportunity to comment on the effect of the undertaking on properties included in or eligible for inclusion in the National Register of Historic Places in accordance with the Council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800). Until these requirements are met, the Council considers the draft environmental statement incomplete in its treatment of historical, archaeological, architectural, and cultural resources. You should obtain the Council's substantive comments through the process outlined in 36 CFR Section 800.9. These comments should then be incorporated into any subsequent documents prepared to meet requirements under the National Environmental Policy Act. Betty J. LeFrey may be contacted at (303) 234-b946, an FTS number, for further assistance.

Sincerely,

  
Louis S. Wall  
Chief, Western Division  
of Project Review

## Response Letter 3

- 3.1 A Memorandum of Understanding between the Bureau of Land Management and the Utah State Historic Preservation Officer has been prepared and signed by the respective parties and is included in this Final EIS as Appendix 11. This memorandum assures compliance with the National Historic Preservation Act of 1966 (as amended) and the Council's regulations as contained in 36 CFR 800 at the appropriate stage of project planning.

## Comment Letter 4

20 December 1983

Reference: White River Dam DEIS

District Manager  
Vernal District Office  
Bureau of Land Management  
17C South 500 East  
Vernal, Utah 84078

Dear Sir:

Thank you for sending me the Draft Environmental Statement (DEIS) for the proposed White River Dam Project. I have reviewed the document and wish to offer the following comments for your consideration.

- 4.1 Page 4, Alternative No. 4: Pumping Water From The Green River:  
It is claimed that compensating flows from Flaming Gorge Dam will mitigate impacts on the endangered Colorado River squawfish. It should be noted that while the depleted water can be replaced using Flaming Gorge Reservoir, the replacement water will be cold and devoid of suspended sediments. This "sterile" water may not suffice to mitigate the deleterious impacts the squawfish is likely to suffer from the proposed withdrawals, as the "native" water resource in squawfish habitat is warm and sediment-laden. Further mitigative measures may have to be initiated, and this should be noted, and explored, in some detail.
- 4.2 Page 9, Introduction:  
Certain assumptions have been used due to the inavailability of data concerning upstream (Colorado) consumptive uses of water. Projected consumptive use data are available for Colorado Oil Shale Lease Tracts C-a and C-b from the lessees and their subcontractors, as well as the Bureau of Land Management Colorado State Office. Some quantified data for these withdrawals should be used in the Final EIS. They should have been utilized in the DEIS, as they are available. Projected oil shale withdrawals in Colorado are likely to be the major consumptive uses of White River water through the remainder of this century.
- 4.3 Page 10, Introduction:  
Altho most investigations of groundwater quality have taken place on the Utah Oil Shale Lease Tracts, the DEIS assumes that groundwater quality outside the tracts is essentially consistent with that found inside the tracts. This assumption is fraught with pitfalls, as the lithology of the Uinta Basin is not spatially consistent over long distances. A cursory check of oil and gas well logs or core samples will reveal significant variation in groundwater characteristics over short distances. Further investigation should be conducted in this regard. The "study area" and "project area" are frequently discussed, but definite boundaries are not described.
- 4.4 Page 24, Applicant-Proposed Mitigative Measures:  
The reclamation of disturbed desert soils is never easy to accomplish. Long-term monitoring, irrigation, fertilization, and mulching are usually necessary to establish self-sustaining vegetative cover. The applicant should be required to post a performance bond to assure this long-term commitment to reclamation.

White River Dam DEIS  
Page 2

- 4.5 Page 90, Oil-Tar Seeps:  
This seep would be inundated if the White River Dam is built, and the text says the seep would be "plugged". "Plugging" a seep is not the same procedure used to plug an oil well, as there is no casing, and perhaps more than one source of the flow. The procedure to be used to stop the flow and protect water quality should be explained.
- 4.6 Page 62, Wildlife:  
This section makes no mention of the Utah Prairie Dog, and the black-footed ferret, two endangered species. The ferret and the prairie dog have a predator-prey relationship that is very sensitive to habitat changes. Ranges, confirmed sightings, and possible occurrences should be discussed. The former ranges of both species may include the project area. If so, mitigative measures should be discussed as well.
- 4.7 Page 91, Environmental Consequences, Alternative 1:  
The text notes that about 165 acres of Oil Shale Tracts U-a and U-b would be inundated by the reservoir but this would not affect mining on the rest of the tracts. Depending on the hydrostatic pressure on the outcroppings of the Green River Formation, some aquifers may transmit increased volumes of groundwater due to back storage of the reservoir. This possibility should be investigated.
- 4.8 Page 95, Water Resources, Downstream From The Proposed Dam:  
The description of "armorine" of streambeds as the "gradual loss of fine sediments and accumulation of larger particles on the streambed..." is not quite correct. Larger particles will not "accumulate" under this process. They will merely be exposed in place where they had formerly been covered by finer sediments.
- 4.9 Page 101, Wetlands And Floodplains, Anticipated Impacts:  
The text notes that thousands of acres of floodplains and over one hundred acres of wetlands will be lost as a result of Alternative 1. Executive Orders 11968 and 11990 are cited, but under "Mitigation" to be initiated as a result of the proposed action, the text says "None". Executive Orders 11968 and 11990, promulgated in May 1977, requiring Federal agencies to avoid actions that will lead to development or loss of floodplains and wetlands, there are no practicable alternatives. If there are no practicable alternatives, then mitigative measures must be instituted, including an eight-step public environmental assessment procedure. The failure of the DEIS to note this requirement, and discuss the mitigative measures, is a serious flaw, and one that could lead to rejection of the DEIS by the Council on Environmental Quality. Each Federal Agency is required to establish its own procedures to comply with E.O. 11968 and 11990. Altho the Utah Division of Water Resources proposes to build the White River Dam Project, the BLM, by granting a Right-Of-Way application, would be the Federal agency responsible for initiating the loss of the floodplain and wetland resource. This glaring omission is perhaps the greatest defect in the DEIS. The DEIS fails to address this issue again on page 119 when addressing the impacts on water resources of Alternative 1.

White River Dam DEIS  
Page 3

- 4.10 Page 135, Table 4-13, Summary of Impacts by Alternatives:  
The table says that "The floodplain would reestablish after the reservoir is filled with sand and silt or is no longer needed". Rubbish! Floodplains at waterfalls are very rare, and when they occur at all, they are very narrow. When the reservoir fills with sand and silt, there will be a 129-foot waterfall at the dam site. If the reservoir is no longer needed, how is the floodplain to be reestablished, through benign negligence? Will the dam be blown up?
- 4.11 Page 138, Table 4-13 (continued):  
There is no data for Alternative 2, the No Action Alternative. Perhaps some speculation as to the cumulative impacts of this Alternative relative to the suggested impacts from the other alternatives would be in order.
- 4.12 Page 199, Glossary:  
The definition of "Fault" should read "A surface or zone of rock fracture along which there has been displacement", not "replacement". The definition of "Gilsonite" should note that this name is a trade name. Unitalia is the generic name for this hydrocarbon, found only in Uintah County, Utah.  
The definition of "100-Year Flood" is inaccurate. It is not "A flood which occurs at a frequency of once every hundred years". It is the flood that has a one percent chance of occurring in any given year. It is merely a statistical probability, not a fact, and may occur in successive years, or not for one thousand years. The long-term average incidence of the 1%-chance flood is once in one hundred years, but saying it will occur once in every one hundred years is totally false, and gives people a false sense of security. Many localities have had the "100-year" flood three times in five years!  
The definition of "Wetland" omits the usual criterion of water-loving plants, or those that require permanent or seasonal inundation of their roots and/or stems.
- The DEIS is attractively packaged and the artwork and graphics are very good. The use of an "artist's conception" of how the visual resource will be impacted is excellent. I hope future EIS and Management Plans will include such "doctored" photographs. Identifying the credentials and experience of the multi-disciplinary team responsible for putting the document together is useful. But only one geographer? A couple more wouldn't hurt. Is my bias showing?

Thank you for the opportunity to comment. I would appreciate the inclusion of my comments in the official record and would very much like to receive a copy of the Final EIS when it is prepared for distribution. Will you please acknowledge receipt of these comments?

Sincerely,

*David L. Schein*  
David L. Schein  
512 Na-Wa-Ta  
Mount Prospect, Illinois 60056

## Response Letter 4

- 4.1 The impacts of pumping water from the Green River as described in Alternative 4 are also discussed on pages 124 and 129 of the Draft EIS. It is the view of the FWS that removal of 97 cfs of water and corresponding releases from Flaming Gorge Reservoir to replace that water would not adversely impact the aquatic ecosystem of the Green River.

On December 5, 1980, the FWS gave a consultation opinion regarding a similar situation regarding water withdrawal from the Green River by the Bonanza Power Plant. It was the opinion that "The reduction in flow would be more limiting to the endangered fishes than the changes in water temperatures or salinity. The endangered fishes are warm water creatures adapted to a wide range in temperatures and salinities."

All the specific life history requirements and exact distributions of the three endangered fish species are not known. In 1979, a Colorado River fish investigation team was established by FWS. The objectives of this investigation are to learn specific life history requirements of the endangered fishes and gather data on them. If Alternative 4 were selected, Section 7 consultation with the FWS would be reinitiated to determine the impacts on the endangered fishes associated with releasing additional water from Flaming Gorge Reservoir for this alternative.

- 4.2 Projected oil shale development in Colorado is considered to be a major consumptive use of White River water in the future. The extent of this need is projected in a report to the United States Water Resources Council prepared by the Colorado Department of Natural Resources (1979). As you noted, the data is also available from other sources.

Computer simulations of reservoir operations and streamflows used in the impact analysis included an allowance for water use in Colorado based on the best information available. Some uncertainty does exist, however, inasmuch as all future conditions are not known.

- 4.3 The intent of the groundwater discussion, as noted on page 10 of the Draft EIS, is merely to point out that studies have been conducted by VTN environmental consultants on Oil Shale Tracts 0a and 0b, the U.S. Bureau of Reclamation, and others throughout the various formations in the Uinta Basin. All studies thus far show that some possibilities exist for groundwater as a water resource. However, studies also show no significant aquifers suitable for most types of development (Austin and Skogerboe, 1970). Additional studies on groundwater would be required to clarify the significant variation in groundwater characteristics should it become important to this project or for other uses.

Regarding "study area" and "project area": Study area refers to the project area and is used only once in the introduction of Chapter 2, page 10 of the Draft EIS. The text has been revised in this final EIS. The project area is shown in Figure 2-6. The linear facilities such as transmission lines and access roads are shown in Figures 2-1 and 2-12, respectively. The borrow material areas, also part of the project area, are shown in Figure 2-9.

- 4.4 The applicant would be committed by BLM to only an initial reseeded or replanting of disturbed areas as outlined in the proposed mitigation. However, the successful reestablishment of vegetation would be better guaranteed if the disturbed areas were managed as intensively as you suggest.

- 4.5 The seep is the result of an unplugged abandoned exploration well. The hydrocarbon seep material has been inspected by the University of Utah, Department of Mining and fuels Engineering (1981). Inspections indicated that the hydrocarbon liquid should be classified as a heavy oil and is more like a tar sand bitumen than the kerosene indicated in the letter from Bingham Engineering (1981b). The source of the oil is more likely to be an impregnated sandstone as opposed to a shale (Hanson, 1981).

The well is probably shallow and has encountered a deep joint system that resulted in a pressure release (Ritzma, 1981). There is apparently no casing, and bedrock is from 8 to 12 feet below the surface. The exposed Uinta Formation is well jointed with high localized permeabilities; however, indications are that these joints tend to close with depth, therefore permitting less transmissivity. Similarly, carbonate rocks in the reservoir foundation are minimal and exploration holes have not revealed evidence of solution channels or cavities. There are no natural hydrocarbon seeps in the project area.

Remedial action to seal the seep would consist of excavating the alluvium down to the bedrock surface to locate the original drill hole. The drill hole would then be reamed to a 6- to 8-inch diameter to a depth of 40 feet and then grouted with cement (Bingham Engineering, 1981b).

- 4.6 This area has never been within the range of the endangered Utah prairie dog, which is limited primarily to central and southwestern Utah. The endangered black-footed ferret has not been seen or reported in the area of the White River Dam impact area for many years and is believed to have been extirpated many years ago. BLM, therefore, believes that the proposed White River Dam and Reservoir would not have any impact on the two species you refer to.

- 4.7 See Oral Testimony Response 34 and Letter Responses 22.3, 27.36, and 27.37.

- 4.8 Your assessment is correct. See the revised Impact section under Water Resources in Chapter 4 of this Final EIS. Water in the river would have the capacity to transport sediment and would pick up a load from the riverbed downstream from the dam. This reentrainment of sediment would produce a scouring of the riverbed during high flows for many miles downstream.

- 4.9 The publishing and public review of this EIS is in conformance with CEQ and NEPA guidelines. Executive Orders 11988 and 11990 have been considered. Alternatives to the proposed action have also been explored which minimize impacts to wetlands and floodplains.

It is indicated on page 101 of the Draft EIS that approximately 995 acres of riparian floodplain would be inundated outside the river channel but within the reservoir area. An additional 4,575 acres of riparian floodplain would be altered between the dam and confluence with the Green River. The 115 acres of wetlands near the mouth of the White River would not be significantly affected by this project, as they are primarily sustained by irrigation return flows. However, the rich and diverse riparian ecosystem is a unique resource, the loss of which cannot be completely replaced in kind. In consultation with the FWS, under the Fish and Wildlife Coordination Act, recommendations have been made to the Utah Division of Water Resources which would reduce the impacts to the

4.9 wildlife habitat affected by the White River Dam Project. Please see the (cont.) FWS Technical Assistance Report, Appendix 10, in this Final EIS.

4.10 The dam would not evolve into a "waterfall" after it filled with sediment. The White River would continue to be controlled by the 10-foot diameter outlet and service-auxiliary spillways. These structures would be kept operational and would continue to control the water as it passed from the elevation of the sediment-filled reservoir to the level of river below.

The sediment-filled reservoir with a river channel meandering through it would eventually become revegetated and, through successional stages, riparian vegetation would become reestablished.

4.11 Table 4-13 in the Draft EIS is a summary of unavoidable adverse impacts. An impact may be defined as any change in the existing environment which would be caused by the project. Therefore, much of the information relative to impacts does not apply to the No Action Alternative. Information pertinent to the No Action Alternative can be found on pages 3, 30, and 118 in the Draft EIS and in this Final EIS.

4.12 See the revised Glossary in this Final EIS for amended definitions of fault, 100-year flood, and wetlands.

The standard mineralogical reference, Dana's Textbook on Mineralogy (4th edition) and other scientific dictionaries equally recognize Gila sonite and Uintaite as mineral species names.

1-8-81

Gourlas Selby  
13<sup>th</sup> St., 500 West  
Lovan, Utah 84321

District Manager  
Vernal District Office  
Bureau of Land Management  
170 S. 900 East  
Vernal, Utah 84078

Sirs:

The Draft White River Dam EIS seems to provide a thorough and comprehensive assessment of potential impacts of the proposed White River Dam project and its alternatives. There are a few areas which seem vague and might be clarified in the final report. Specific comments are included below:

- 5.1 The potential problem of pollution of the reservoir from oil seeps is briefly mentioned. Could filling the reservoir cause new seeps?
- 5.2 Pages 22 & 100, If inactive storage area is divided by the sedimentation rate a figure of 29.5 years for filling the inactive storage area is obtained. This does not agree with the 33 years stated in the report.
- 5.3 Page 41. The White River reservoir could serve as a point of introduction of sport fish which could make their way into the habitat of the Colorado squawfish. This could have a negative impact on the squawfish and other native species.
- 5.4 Would the noise of the pumps for alternatives 3 & 4 affect terrestrial wildlife, in particular, nesting birds?
- 5.5 Page 51. The report mentions the lack of an interstate compact between Colorado and Utah concerning the White River

- 5.5 (cont.) and the potential for reduced flows into Utah. Extensive use of White River water by Colorado for their own energy development seems inevitable. If Colorado reduces the flow into Utah will the proposed project still be able to maintain downstream flows of 250 cfs as projected in the EIS? Will the reservoir be able to supply the 70,000 AF per year specified in its design? It would seem necessary that an interstate agreement be reached governing the White River before construction of the dam.
- 5.6 Page 51. Flows below 100 cfs have occurred in the USGS data for the Hamsley gaging station upstream of the project area.
- 5.7 Page 47. Very few razorback suckers below the size of mature adults are recorded in recent literature even though the characteristic razor shaped keel would be present in fish approaching maturity and so identification would not pose the problem encountered with young fish. It may be possible that the razorback sucker is not successfully reproducing at all and that the remaining adults were spawned prior to some earlier disruption of the Green river ecosystem, perhaps the closing of Flaming Gorge Dam.
- 5.8 Fugitive dust controls should be discussed under mitigation of impacts.
- 5.9 Page 103. Salt cedar will probably become established around the reservoir. Could this lead to problems with revegetation and increased evapotranspiration?

- 5.10 Page 105. Will the reservoir have any benefits for wildlife?
- 5.11 Page 142. The cumulative impacts of this and other proposed projects is clearly going to have severe impacts on the native fishes. If the Colorado basin river ecosystem is to be maintained for the survival of the native fishes it is obvious that not all the proposed projects can take place. It may be time to recognize this and to examine projects on the basis of their cumulative impact. Projects with the greatest benefits and least environmental damage should be selected and others abandoned or else modify all the proposed projects so that they can all be built without destruction of the native fish habitat.
- 5.12 No mention was made of a cost-benefit analysis for any of the alternatives. Was a cost-benefit analysis made?
- 5.13 What are the environmentally preferred and the BLM preferred alternatives?
- 5.14 What is the potential for treatment and reuse of shale processing waters? Water reuse could reduce the withdrawal from the White River so that a smaller scale project such as the Hells Hole reservoir might be suitable.
- Alternative J seems to be the best to meet the stated needs with the minimum environmental damage.

Yours truly,  
*Douglas Selby*  
Douglas Selby

## Response Letter 5

- 5.1 See Letter Response 4.5. It is not likely that filling of the reservoir would cause new hydrocarbon seeps.
- 5.2 The proposed reservoir's inactive storage was assumed to be 38,000 acre-feet. That figure has been revised to 38,550 in this Final EIS. Using the assumptions as noted on page 100 in the Draft EIS, 122 acre-feet of bedload would be going into active storage. The 1,151 acre-feet of suspended sediment load would be trapped in the inactive storage until it was filled up in approximately 33 years (calculated 32.6 years). The total reservoir would fill up with sediment in about 86 years, assuming the new reservoir size of 109,250 acre-feet. The assumptions are based on no river development upstream in future years.
- 5.3 It is acknowledged on page 108 of the Draft EIS that the White River Dam and Reservoir would impact the aquatic ecosystem above and below the dam. It is doubtful that fish planted as game species would use the White River above the reservoir basin. The outlet works redesign would enable selective water withdrawal. Various temperatures could be maintained in the river downstream from the reservoir. It is the opinion of the FWS that, if the dam operating procedures and conservation measures described in the official Biological Opinion were implemented, the White River Dam Project would not likely jeopardize the continued existence of the Colorado squawfish (See Appendix 4).
- 5.4 Initial analysis has determined that the impact to wildlife from the pumps would not be significant when compared to the habitat available and/or the number of species or individual animals involved.
- 5.5 Your concerns are generally correct. Others believe that Utah and Colorado should come to some agreement on the use of the White River water. If the basic assumptions are changed regarding annual flows into Utah, then the project analysis would have to change. However, using the assumptions in the EIS, the reservoir would be able to supply 70,000 to 75,000 acre-feet per year as specified.
- 5.6 Your comment is correct. The gaging station near the state line which you referred to showed that on December 22, 1977, 100 cfs was recorded. On the same date, downstream at the Watson gaging station, 96 cfs was recorded. December is historically a low flow month; for example, the mean (average) flow for December 1975 was 95 cfs. Flow data used for the EIS were taken from the USGS gaging station near Watson, Utah. The mean conditions are those used as rounded off for the data presented in this EIS.
- 5.7 Page 67 of the Draft EIS addresses the razorback sucker, and it is acknowledged that juveniles have only been reported once. The lack of young is a perplexing problem. This species may be adversely affected by changes in water quality and quantity reaching the Green River. As stated in the Cumulative Impacts section of the EIS, individual projects would probably not have a serious effect on the fish populations but, considered cumulatively, projects would likely significantly impact the razorback sucker.

- 5.8 Fugitive dust control is addressed in Chapter 2 of the EIS under Applicant-Proposed Mitigative Measures in this Final EIS. The subject is also addressed under Visual Resources, Mitigation section in Chapter 4. Water would be used to control fugitive dust.
- 5.9 Salt cedar (*Tamarix chinensis*) is already an abundant component of the riparian community that would be affected by the White River Dam. This exotic phreatophyte would probably become reestablished around the reservoir, although not as profuse as current growths or thickets. Salt cedar would become most abundant where the reservoir caused an elevation in the water table (i.e., areas close to the same elevation as the reservoir). Salt cedar would increase in the floodplain near the headwaters of the reservoir and in flooded side canyons. Since most revegetation would be on arid sites above the elevation of the reservoir, little interference in reestablishing native vegetation is expected. Total transpiration by salt cedar would probably be reduced within the reservoir area due to the reduction in riparian habitat.
- 5.10 Usually when an ecosystem is disrupted or changed, there are trade-offs. Some species of wildlife suited to large, placid bodies of water would eventually move into and occupy the new habitat. However, the number and variety would be far less than those species occupying the existing habitat.
- 5.11 Because of the concerns surrounding the native fish habitat issue, a special study team was assigned to evaluate the cumulative impacts on this habitat. This study was funded by the BLW and staffed by specialists from the FWS. An official Biological Opinion from the FWS is included in this Final EIS as Appendix 4.
- 5.12 A cost-benefit analysis of the alternatives was not made.
- 5.13 The agency-preferred alternative is included in Chapter 2 of this Final EIS. The environmentally preferred alternative will be part of the Record of Decision.
- 5.14 A draft summary report entitled "The Availability of Water for Oil Shale and Coal Gasification Development in the Upper Colorado River Basin," (Colorado Dept. of Natural Resources, 1979), considers alternatives to meet consumptive water demands for regional emerging energy technology developments, including oil shale. This study anticipates the cost effectiveness of process water treatment and reuse. The conclusion is that very limited supplies can be expected from reclaimed water to meet expanding energy development needs. Data concerning site-specific quantity and quality in the shale processing waters are variable and much data are currently unavailable.

## Comment Letter 6



DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Centers for Disease Control  
Atlanta, Georgia 30333  
(404) 262-6649

January 7, 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
170 S. 500 East  
Vernal, Utah 84078

Dear Sir:

We have completed our review of the Draft Environmental Impact Statement of the White River Dam Project. We are responding on behalf of the Public Health Service.

- 6.1 A three phase development plan has been recommended regarding the recreational aspects of the proposed project. In each phase described, toilets are the only sanitation facility addressed. The final EIS should also include in this discussion the need for solid waste collection and disposal, drinking water, and vector control.
- 6.2 The specific impacts associated with an estimated increase of 3.4 mg/l in salinity at Imperial Dam, California, should be clarified. Annual costs associated with this rise in salinity is noted on page 98, however, the purpose of these costs is not explained.
- 6.3 Exploratory oil drill holes located near the White River, as noted on Page 8, currently show thick crude oil and could be a pollution problem if not properly capped. This pollution factor is not discussed in chapter 4: Environmental Consequences. Anticipated impacts and specific mitigation measures planned regarding these oil drill holes should be included in the final EIS.

We appreciate the opportunity of reviewing this statement. We would appreciate receiving a copy of the final document when it becomes available.

Sincerely yours,

Frank S. Lisella, Ph.D.  
Chief, Environmental Affairs Group  
Environmental Health Services Division  
Bureau of State Services

## Response Letter 6

- 6.1 Phase 1 recreational facility development proposes installation of pit toilets, parking facilities, and a boat ramp at the dam site. Inter-mittent care/maintenance of these facilities, including waste collection and disposal, would be accomplished by the Utah Department of Parks and Recreation or through contractual arrangements by them. Provision of drinking water is not proposed for Phase 1 development.

Facility development during Phases 2 and 3 would be dependent on demonstrated demand. The Utah Division of Water Resources has indicated intent to determine if culinary water could be made available in the Ignatio area from the Town of Bonanza's water collection facilities there.

Standard clean-up/maintenance activities would preclude problems with vector control. Therefore, this was not viewed as a significant impact nor addressed in the Draft EIS.

- 6.2 For clarifying the impact of 4.1 mg/l increase in salinity associated with the construction of the White River Dam or alternatives, it should be understood that this technique is the accepted "state-of-the-art" method for measuring impacts of projects on the Colorado River system. The purpose of estimating these costs is to translate into dollars the effect those impacts would have on municipal and industrial water (i.e., what it would cost to desalt the water and make it usable). The costs also express the loss of agricultural crops caused by increased salinity in the Colorado River. Also, see Chapter 4, Cumulative Impacts section in this Final EIS.

- 6.3 See Letter Response 4.5. The pollution factor was not discussed in Chapter 4 because the problem was mitigated in Chapter 2, Page 30 of the Draft EIS: "This seep would be plugged prior to filling the reservoir." With the problem or pollution factor gone, it was not necessary to discuss it in the Environmental Consequences section.

# Comment Letter 7

January 7, 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Dear Sir:

We appreciate the opportunity to comment on the draft EIS for the White River Dam.

For a number of years, we have supported the concept of a reservoir on the White River. The oil shale development which is now on the horizon heavily accentuates the need for that Reservoir. We favor the construction of the dam as proposed in alternative 1.

7.1 We would like to submit an updated manpower schedule for the Utah energy projects that are listed on page 145. The schedule is enclosed.

Again, we view the White River Dam and Reservoir as critical for oil shale development, and urge its construction and utilization.

Sincerely,

  
George Ruth  
Executive Director

## MANPOWER SCHEDULE

	1981	82	83	84	85	86	87	88	89	90	91	92	93	94
MOON LAKE	227	457	919	1221	936	833	200	200	200	200	200	200	200	200
PARIAH		400	600	1000	1000	• 1120	520	520	520	520	520	520	520	520
TOSCO				5	505	1205	2210	3130	4025	3260	2260	1760	1260	1260
GEOKINETICS	30	440	450	650	1050	1400	660	920	970	1020	1020	1020	1020	1020
WHITE RIVER OIL SHALE	200	600	1450	525	780	830	2330	4850	5090	4600	4700	3900	2900	3100

Source: State Planning Coordinator's Office, State of Utah, White River Oil Shale DDP, Uintah Basin Association of Governments.

# Response Letter 7

7.1 We acknowledge the information sent to us; however, since receiving your comment letter, the data has again been revised. Please see the following table for updated employment projections.

TABLE 1

Summary of Employment Estimates for Oil Shale and Tar Sand Projects in the Uinta Basin

Project	Construction Period	Peak Construction Work Force (Year)	Initial Operation Capacity (bpd)(Year)	Full Scale Operation Capacity (bpd)(Year)	Peak Operation Work Force
Enercor-Mono Power (tar sand)	1/82-1/90	1,670 (1986-1989)	5,000 (1984)	50,000 (1990)	400 (mine) <sup>a</sup> 1,000-1,500 (plant) <sup>b</sup>
Magic Circle (oil shale)	1982-1987	810 (1985-1986)	8,220 (1986)	31,500 (1988)	1,348
Paraho (oil shale)	8/82-8/86	3,500 (1985)	10,000 (1984-1985)	38,250 (1986)	1,500
Syntana-Utah (oil shale)	7/82-12/85	3,146 (1984)	8,000 (1986)	16,500 (1988)	814
Tosco (oil shale)	1983-1987	3,000 (1986)	40,000 (1988)	48,000 (1989)	1,500 <sup>c</sup>
Geokinetics (oil shale)					
Lofreco (in-situ)	mid/83- mid/2013	1,000 (1992-1993)	2,000-5,000 (1983-1984)	50,000 (1992-1993)	100 per unit (10 units total)
Agency Draw	late/83- late/85	800 (1984-1985)	5,700 (1986)	12,000 (1989)	450
Sohio Shale Oil (tar sand)	early/82- late /82 <sup>d</sup>	unknown	24 (1989) <sup>d</sup>	20,000 (1989)	unknown

<sup>a</sup>50 million tons per year production.<sup>b</sup>Total for three shifts.<sup>c</sup>Based on Tosco's Colony Project in Colorado.<sup>d</sup>For pilot plant; data for commercial plant unknown at this time.

## Comment Letter 8

323 South Second West  
Tonele  
Utah 84074

January 10, 1981

Vernal District Office  
Bureau of Land Management  
Vernal, Utah

Dear Sir:

- 8.1 Utah Nature Study Society has adopted the position on the White River Dam and Reservoir Draft Environmental Impact Statement that no dam should be built for the next ten years or until desert riparian habitat has been fully studied. We request that you include this letter in the Final Environmental Impact Statement on the White River.
- 8.2 Utah Nature Study Society notes that the water requirements for oil shale development are not at this time known. Utah Nature Study Society actually request that all potential developers in the region file a plan of water needs for each year for the next twelve years and publish this plan in the Final Environmental Impact Statement on the White River.
- 8.3 Utah Nature Study Society is deeply concerned that the ecology of desert riparian habitats is poorly studied. The Society also notes that desert riparian habitats in Utah are rapidly being altered by water users. Until a full study on the biological productivity of desert riparian habitats is completed, there will not be any base lines to measure the effects of the development on this rare habitat type.
- 8.4 Although it is recognized by the Society that oil shale may be an important energy source for the United States, the Society also notes that water resources in arid regions can have even greater importance. To sacrifice the water resources prematurely or unwisely is very poor planning.

Sincerely,  
*Marla Dickerson*  
Marla Dickerson  
President,  
Utah Nature Study Society

*\* Organized in 1954  
520 Memberships  
60 out of state members*

## Response Letter 8

- 8.1 The views expressed will be considered in the decision-making process.
- 8.2 See revised Chapter 1, Purpose and Need section of this final EIS for a discussion of water requirements for oil shale development.
- 8.3 The riparian zone within the expected impact area has received direct and indirect, formal and informal study since about 1973 (see Bibliography - Baumann, R.; Bendlow, P. A.; Behle, W. H.; Carlson, C. A.; Clyde, C. G.; Cranney, S.; Drobnick, R.; Evans, D.; Grant, C. V.; Grenney, W. J.; Holden, P. B.; Kidd, G.; Joseph, T. W.; Olsen, P. F.; Smith, H. D.; and VIN Colorado, Inc.). One organization, Bio-Resources of Logan, Utah, has 6 years of continuous studies in conjunction with the White River oil shale. We believe that these studies give sufficient baseline data from which to make a decision concerning the impacts of the proposal or an alternative.
- 8.4 BIM agrees that water resources are of great importance, especially in arid regions. Judicious use of water resources is a primary planning concern of the Federal and State agencies having water management responsibilities.

## Comment Letter 9

### *Uintah Water Conservancy District*

28 WEST - 1325 NORTH

" STEINAKER DAM "

VERNAL, UTAH 84078

PHONE 789-1651

January 14, 1981

District Manager, Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Gentlemen:

- 9.1 On January 8, 1981 I submitted a statement at the public hearing concerning the Draft Environmental Impact Statement of the White River Dam Project. In my statement I commented that the flow of the White River had been as low as 50 second feet. I would like to correct that part of my statement as I have made further review of the flow of the White River at Watson and the records show that in July of 1977, the low flow of the White River reached 13 second feet.

I feel this is very significant in justifying the construction of the White River Dam and guaranteeing water in the White River below the dam and the confluence with the Green River at Ouray, Utah.

Very truly yours,



L. Y. Siddoway  
Manager

vj

## Response Letter 9

- 9.1 We concur that on July 3, 1977 the low flow of the White River at the gaging station near Watson, Utah was 13 cfs. However, the flow data used for the proposed project in the EIS considers the mean historical runoff for the White River near Watson.

## Comment Letter 10



DEPARTMENT OF THE ARMY  
SACRAMENTO DISTRICT, CORPS OF ENGINEERS  
650 CAPITOL MALL  
SACRAMENTO, CALIFORNIA 95814

REPLY TO  
ATTENTION OF SPACD-0

9 January 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
170 S. 300 East  
Vernal, Utah 84073

Gentlemen:

This letter is to provide our comments on the White River Dam Project Draft EIS prepared by your office.

- 10.1 In a letter dated 3 May 1980 from your Utah State Office, it was requested that we be a cooperating agency in the preparation of the White River Dam Project EIS. By letter dated 29 May 1980, we agreed to be a cooperating agency. We would appreciate being listed as a cooperating agency on Page iii of the EIS.
- 10.2 The Green River is navigable from above Green River, Utah to its confluence with the Colorado River. The Colorado River is navigable from the mouth of Gault Creek to Cataract Canyon. The project would have an insignificant effect on the navigability of these two river reaches and would not impact Corps of Engineers flood control projects or investigations.
- 10.3 In Appendix I of the Draft EIS entitled "Federal and State Authority Actions" it should be noted that any of the alternatives which would involve placement of dredged or fill material in "waters of the United States" or their adjacent wetlands would require a Department of the Army permit under Section 404 of the Clean Water Act.
- 10.4 The Environmental Consequences Section of the White River Dam and Reservoir Alternative indicated that there will be a loss of 995 acres of riparian habitat due to inundation, and the alteration of 4575 acres of riparian habitat between the dam and the confluence with the Green River from the decrease of high flows and stream channel narrowing. The importance of this habitat to wildlife is discussed although there is no mitigation proposed for this significant loss. Based on our experience in processing Section 404 permit applications similar to the White River Reservoir, we have found through our public interest review that the benefits of the project may be outweighed by large unmitigated losses of fish and wildlife values. Therefore, it is suggested that reconsideration be given to mitigating significant losses which would result from the reservoir alternative.

SPACD-0  
District Manager, Vernal District Office

9 January 1981

If you have any questions, please contact Mr. Jim Gibson of our staff at telephone (FTS) 448-2341.

Sincerely,

JAMES P. EAST  
Acting Chief, Construction-Operations  
Division

## Response Letter 10

- 10.1 The Corps of Engineers has been most helpful in the preparation of the Draft EIS. The omission of listing this agency was not intended. The text has been revised in Chapter 1, Scoping Process section, in this Final EIS.
- 10.2 Water withdrawal would be about 1 to 3 percent during all months. Clyde (1980) concludes that as much as a 4.1-percent depletion might be made from the Green River. The mean low flow at Green River, Utah is 3,001 cfs and the worst case analysis could reduce the flow to 2,870 cfs in September (see Table 4-2). Navigability would not be significantly affected, according to the EIS findings.
- 10.3 Appendix 1 in this Final EIS has been revised as suggested.
- 10.4 The Utah Division of Water Resources and the FWS have agreed on recommended mitigation measures which, for the most part, would alleviate your concerns. For more information, please see the revised Mitigation sections of Chapter 4; Appendix 4, FWS Biological Opinion; and Appendix 10, FWS Technical Assistance Report.

## Comment Letter 11



DS  
EIS

OFFICE OF THE SECRETARY  
STATE OF UTAH

STATE OF UTAH  
DEPARTMENT OF COMMUNITY AND  
ECONOMIC DEVELOPMENT

Division of  
State History  
UTAH STATE HISTORICAL SOCIETY

MELVIN SMITH DIRECTOR  
100 WEST 100 SOUTH  
SALT LAKE CITY, UTAH 84119  
TELEPHONE 801-533-5700

January 14, 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
1705 South 500 East  
Vernal, Utah 84078

RE: Draft White River Dam Project

Dear Sir:

In response to your request for review and in accordance with your responsibility as outlined in 36 CFR 800.4, we are happy to consult with you concerning your project.

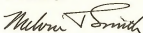
The staff of the Utah State Historic Preservation Office has received the Draft White River Dam Project.

- 11.1 Concerning eligibility of the sites themselves, the EIS identifies only the Ignacio Stage Stop as a specific historic site and correctly suggests that it is a candidate for the Register. The section on anticipated impacts on cultural resources, page 115, refers to 21 known historic and prehistoric sites in the area, but does not identify other historic sites specifically. It is known by our office and the BLM that there are other sites in the area that need to be identified.
- 11.2 This statement seems to be adequate in that it addresses known information and makes suggestions for what more information is needed. Our office would suggest that the final statement reflect a commitment to seek a programmatic memorandum of agreement with the SHPO and the Advisory Council for mitigation as outlined by 36 CFR 800.

## Response Letter 11

Should you need assistance or clarification, please call or write James L. Dykman, Cultural Resource Advisor, or Wilson G. Martin, Preservation Development Coordinator, Utah State Historical Society, Preservation Development, 300 Rio Grande, Salt Lake City, Utah 84101.

Sincerely,



Melvin T. Smith  
Director and  
State Historic Preservation Officer

JLD:jrc:A715UN

11.1 The Memorandum of Understanding (Appendix 11 in this Final EIS) for this project provides for the identification and mitigation of sites on all areas which would be disturbed prior to such disturbance.

11.2 A Memorandum of Understanding for this project is in effect and has been signed by the BLN and Utah State Historic Preservation Officer. See Appendix 11 in this Final EIS.

## Comment Letter 12



18 WEST 100 SOUTH  
SUITE 100  
SALT LAKE CITY, UTAH 84115  
TELEPHONE 368-2072

### OFFICERS

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President

MALCOLM YOUNG  
District Manager

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MALCOLM YOUNG

January 21, 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, UT 84078

SUBJECT: White River Dam Project.

Dear Sir:

- 12.1 Utah Wool Growers have reviewed the EIS statement on the White River Dam. In reviewing grazing AUM's, we observe the AUM's from the project are minimal. However, we would recommend if the project is to be completed that with even minimal reduction in AUM's that primary consideration be given to livestock grazing and secondary to wildlife, and that where possible, the AUM's be restored.

- 12.2 In the revegetation process around the dams we recommend these areas be vegetated with forage for livestock and the local livestock permittees be given first priority.

When you talk of 15 years for revegetation, that area is lost to a generation.

Sincerely,

*Hatch Howard*  
Hatch Howard  
President

HH:frc

## Response Letter 12

- 12.1 The forage lost by construction of the White River Dam would eventually be restored to the livestock operators to the extent possible, consistent with multiple use management. On public lands, vegetation (forage) is allocated to wildlife and livestock with equal consideration given to each, and priority is based on need and availability.

- 12.2 Mitigation measures for revegetation call for the transplanting or seeding of native plant species adapted to the environmental conditions of the area. These would most probably be shadscale, four-wing saltbush, greasewood, and sagebrush; with grasses such as ricegrass, sand drop seed, and wheatgrasses. Livestock operators (permittees) who currently have grazing privileges on the affected allotments would maintain these privileges. However, due to the clearing of nearly 1,500 acres of vegetation which has a forage production capacity of between 10 and 20 acres/-AUM, there would have to be an adjustment in the number of animals allowed to graze. It could take up to 15 or 20 years for the disturbed lands to return to their original productivity.

## Comment Letter 13

# WHEOA!

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GERTRUDE BRONN, Honorary  
In Memoriam  
LOUISE C. HARRISON  
VELMA B. JOHNSTON, "Wild Horse Annie"

### WILD HORSE ORGANIZED ASSISTANCE

INC.  
A Foundation for the Welfare of  
Wild Free-Roaming Horses and Horses

P. O. Box 155  
Reno, Nevada 89504  
Telephone 725-9904  
Area Code 702

Kathryn Cushman  
Box 26  
Canterbury, New Hampshire 03224  
January 22, 1981

District Manager  
Verml District Office  
Bureau of Land Management  
170 S. 500 East  
Verml, Utah 84078

Dear Sir:

I have reviewed the white river Dam Project Draft Environmental Impact Study and offer the following comments.

- 177
- 13.1 According to the information provided in the study, the 34 wild horses will be allowed to remain where they are and will be disturbed only during construction of the power transmission system. If alternative #1 is adopted, how long a time period is involved and at what time of year is it to take place? Will steps be taken to minimize disturbance to the horse herd? Would access roads or recreation areas affect the horses range area in the future? The horses want to disturbance in their area. It would be advisable to avoid any major disruption during the foaling season.
- 13.2 Alternative #4, though more costly, would be a more sound choice than alternative #1. It is assumed that there would be no impact to wild horses since no mention is made of horses in regard to environmental consequences.
- 13.3 Much loss of wildlife habitat will result from coal leasing in the Green river-arms Fork region (Colorado and Wyoming on the Utah border). The white river Dam project is within 50 to 100 miles of the coal leasing area. A great deal of environmental disruption is proposed for a relatively small area involving the 3 states. Have the effects of the white river Dam Project been considered in conjunction with the effects of the Green river-arms Fork coal leasing? It would be most helpful to see a U.S. Fish and Wildlife Service opinion as to the combined effect on wildlife, particularly bird species.

Thank you for the opportunity to comment on the white river Dam Project. The study is presented clearly and concisely.

Sincerely,

*Kathryn Cushman*  
Kathryn Cushman

## Response Letter 13

- 13.1 Approximately 3 months, with an additional 2 weeks for clean-up and reseeding of disturbed areas, would be required for construction of the transmission system and substation. The construction would probably take place some time during April to November. The wild horses could be displaced from habitual trailing or grazing areas for a few days or weeks. Since horses are adaptable to temporary disturbance, it is unlikely that construction or operation of the system would have any significant effect on the horse herd. Only a minute portion of the available forage would be temporarily affected. In the long term, horses would benefit from the increased variety of vegetation from seeding of disturbed areas.

The access roads and recreational developments proposed in conjunction with the dam and reservoir would be outside the existing wild horse habitat. About 2 miles of the transmission system would extend into their existing range.

- 13.2 Thank you for your comment. Your opinion will be considered in the decision-making process. Your assumption that there would be no significant impacts to the wild horses under Alternative 4 is correct.

- 13.3 Page 142 of the Draft EIS addresses cumulative impacts. We recognize that the greatest impacts to wildlife species would come from cumulative and secondary impacts rather than from the proposal or any of the alternatives. The FWS Technical Assistance Report is included as Appendix 10 in this final EIS.

# Comment Letter 14



IN REPLY REFER TO

DES-80/74

## United States Department of the Interior

HERITAGE CONSERVATION AND RECREATION SERVICE  
MID-CONTINENT REGION  
DENVER, COLORADO 80225

MAILING ADDRESS:

Post Office Box 25387  
Denver Federal Center  
Denver, Colorado 80225

FEB 6 1981

### Memorandum

To: Lynn Leishman, Team Leader, RSM, Richfield, UT  
From: Assistant Regional Director, Land Use Coordination  
Subject: Review of draft environmental statement for the White River Dam Project

### General Comment

- 14.1 We are concerned about cumulative impacts to cultural resources resulting from this project and the interrelated projects in the Upper Green River System. In addition, these energy development projects would increase the severity of impacts to these valuable nonrenewable resources. Cumulative impacts should be taken into consideration in project decisions and in the development of adequate mitigation measures.
- 14.2 We urge continued consultation with the State Historic Preservation Officer (SHPO) concerning additional cultural resource surveys, requests for determinations of eligibility for the National Register of Historic Places, and other compliance procedures as described in 36 CFR 800. Correspondence with the SHPO should be included in the Final EIS along with the Memorandum of Understanding for this project between BLM and the Utah SHPO.
- 14.3 The final list of Nationwide Rivers Inventory components has recently been developed for the Mid-Continent Region. That list includes the White River (Green River to Colorado/Utah State line) and the Green River (Colorado River to Flaming Gorge Dam).
- Federal executive licensing or action agencies are required to comply with the Council of Environmental Quality Memorandum for Heads of Agencies, dated August 10, 1980, on the subject of "Interagency Consultation to Avoid or Mitigate Adverse Effects on Rivers in the Nationwide Inventory." A copy of these requirements, published September 9, 1980, in the Federal Register, is included. Under the CEQ requirements,

### 14.3 (cont.)

it is the responsibility of the BLM to contact this office for further consultation in the case where Nationwide River Inventory segments will be affected by a project to the extent that inclusion in the National Wild and Scenic Rivers System would be precluded or classification within it would be altered.

The Nationwide Inventory segment of the White River possesses certain values that may be of national significance, including fish and wildlife and recreation. We note that BLM has initiated formal coordination with the U.S. Fish and Wildlife Service, and we shall rely on that agency to address concerns relating to fish and wildlife. The White River Dam would eliminate canoeing and rafting from the project area and may adversely affect these activities downstream by reduction and regulation of flow. Alternatives 3 and 5 may also adversely affect boating on the White River through their 70,000 acre-foot annual depletion of the stream.

The Green River possesses several values that may be of national significance; but, apparently, only fishery values will be seriously affected by the proposed action or alternatives. Again, we shall defer to the FWS to address this concern.

- 14.4 The final document should recognize, at a minimum, that adoption of Alternative 1 would preclude any future inclusion in the National Wild and Scenic Rivers System of a 13.5-mile stretch of the White River and, perhaps, the segment between the project and the Green River as well. In compliance with the CEQ requirements, BLM must determine if other consequences of the proposal or alternatives are serious enough to warrant specific analysis in the final document or consultation with HCRS.

### Specific Comments

- 14.5 Page 113, Environmental Consequences, Recreation (Alternative 1): "The quality of canoeing and rafting currently experienced would be reduced in the 13.5 miles (22 km) of reservoir, which would become flat water." Though somewhat amusing in the measure of its understatement, perhaps accuracy would be served by intimating that canoeing and rafting would, in fact, be eradicated in that 13.5-mile stretch.
- 14.6 Page 124, Environmental Consequences, Recreation (Alternative 3): "The depletion during drought years could reduce the canoeing potential; but, since actual use is small, the impact would be small." We do not necessarily subscribe to the implication that the magnitude of this impact is directly related to the number of users and, thus, is small. Impact could as easily be related to the quality of the stream as a canoeing or rafting resource and any reduction of recreation potential be considered a substantial impact.
- 14.7 Pages 137 and 139, Unavoidable Adverse Impacts, Recreation (Alternatives 1 and 3): The descriptions have apparently been transposed.

*Robert J. Atkins*  
Robert J. Atkins

## Response Letter 14

- 14.1 While it is true that an increasing number of cultural resources are lost each year because of energy and related projects throughout Utah, there is, at present, no way to develop legally based mitigation for cumulative impacts to these resources. Mitigation based in existing legislation remains a project-specific item.
- 14.2 Consultation with the State Historic Preservation Officer (SHPO) is spelled out in a Memorandum of Understanding signed by the Utah BLM and Utah SHPO (Appendix 11 in this Final EIS). Consultation will take place as specified.
- 14.3 Your office was contacted and CEQ-required consultation was completed in April 1981.
- 14.4 See the revised Recreation sections in Chapter 3 and 4 in this Final EIS regarding White River potential for inclusion in the National Wild and Scenic Rivers System.
- 14.5 Rafting in the 13.5-river-mile area inundated by the reservoir would be essentially eradicated. However, flat-water canoeing, a sport enjoyed by some people, would still be possible. To canoeists who prefer stream-/river canoeing, the reservoir could constitute an unpleasant obstacle in a trip down the river. It is recognized that the majority of canoeists in this region apparently prefer stream canoeing. Therefore, it is concluded that canoeing on this portion of the White River would significantly decrease if the dam were constructed.
- 14.6 It is recognized that the essentially pristine character of major segments of the river and the opportunities for solitude available because of low use volumes contribute to the recreational values of the river. The revised Recreation section of Chapter 4 in this Final EIS notes the adverse impacts on canoeing and rafting which would result from the White River Dam Project. Also, the project would alter the affected segment's ability to meet eligibility and classification criteria for designation as a wild, scenic, or recreational river.
- 14.7 Table 2-1 has been corrected in this Final EIS.

## Comment Letter 15

District Manager  
Vernal District BLM  
170 South 500 East  
Vernal, Utah 84078

January 16, 1981

Dear Sir:

Please enter these comments on the BLM's Draft EIS of the White River Dam Project in the official record for that process. I have some very serious concerns regarding process and allocation of funding, permits and lack of environmental attention to the affected environment and the manner in which comments by public input participants in the earlier plans for the White River Dam were ignored.

I first have an ethical concern: Mr. Jay Bingham of Bingham Engineering is the contracted consultant for the White River Project. Mr. Bingham was also the head of the Utah Division of Water Resources until 1967, before Mr. Lawrence. I find it quite a coincidence that the State would go to a former head of the Division over other bidders who may have had at least equal expertise and frugality in the White River project development. This implication must be cleared to not further confuse the White River process.

- 15.1 I have a concern that no action has ever been taken to study the scenic and wild river classification of the White River, although proposed by Utahns consistently over the years. Only the lower portion was included in a State of Utah recommendation for Wild and Scenic River Study, not the wild, rich, riparian habitat of the upper portions. This is in direct conflict with the oil shale target for the region--definitely not a Multiple Use decision of land use. Could not a quarter mile intrusion restriction be issued from the river banks? This would lead needed protection of the riparian values. The wild and scenic nature of the river will not as the ES indicates be duplicated by dam vegetation. This will be steep sagebrush terrain as it is presently, except during draw-down when there will be no vegetation at all.
- 15.2 What of dam safety? The plan offers no guarantees for the public safety.
- 15.3 The presence of endangered fish has been ignored: "No factual basis of" the existence of threatened or endangered fish in the White River (1977 State Plan on the White River Dam and Reservoir for Irrigation of Indian Lands and Oil Shale Development) became "in spite of their existence, not enough fish exist to water and require the Division of Wildlife Resources to designate critical habitat for the species in the White River, after public input and consultation with biological administrators, not the biologists themselves. All this with a pre-MPA and ESA poisoning of the white and Green Rivers to remove the "trash" squawfish. Why not pursue a catch and release program and establish a sport fishery for the species? THIS COULD BE A WORKABLE SOLUTION.

- 15.4 The Utes' "understood approval" of the benefits of the White River Dam are nonexistent. Little communication exists and I dare say other than the issuance of this document the tribe is unaware of the losses to be sustained by wildlife (200 deer and 68 fawns yearly lost), 176 beaver, countless birds displaced, etc.), recreational assets and hunting opportunities. But then this is the traditional way of dealing with Native Americans. We in 1981 would not dare venture to right a few wrongs by initiating a trend of honesty and active participation with a directly affected public. This angers me intensely.
- 15.5 Economically, the White River Dam does not stack up to a sound cost/benefit ratio. Hydroelectricity from an active storage of 70,000 acre feet on the White River, combined with an evaporative "energy loss," high siltation rate in the reservoir and elimination of wildlife habitat in my mind is ludicrous. Why not let the value of the natural flow and future sound uses of this arid region's water dictate planning for the White, not just the highest bidder? A hydroelectric dam in the arid Utah Basin would lose all economy in evaporation and all renown as pollution free when diverted to a coal-burning power plant and oil shale development. I do not approve of my taxes supporting oil shale development through state subsidy of this water project while my local water costs rise exponentially and wildlife and recreational values on the White are lost. But then the State never has listened to the less returnable dollar interests. State commitment to the highest bidder, no matter how unreasonable I am afraid, is an inequity long document.
- 15.6 I would like to propose, in conjunction with biologists who have recorded the natural values of the White River region, that this desert riparian habitat should receive full study for habitat and wildlife productivity. What species will be impacted? Will adaptation occur? How will historical wildlife uses of the White River flood plain be altered? Beaver, birds, deer on the White from Kangelly, Colorado to the confluence with the Green River should be studied to determine abundance, habitat needs, welfare and inferred impact. In conjunction with these studies, reptiles and small mammal populations should be taken into consideration.
- 15.7 Fishing and boating will not improve beyond current catfishing and existing boat use. Canoeing is a blossoming water sport in Utah. The opportunities on the White for beginners are excellent (in cooperation with wildlife breeding activity and the high use potential of spring run-off. Serious draw down would essentially eliminate this new but promising sport. Like cross-country skiing, the future of canoeing will experience a boom. Yet without adequate siting, represented by the White and Virgin rivers and several of the south slope streams of the High Uintas, this form of outdoor Utahe of the future. ORV use by oil shale workers and associated population has already been projected to increase in the Basin; non-motorized recreation must be provided equal status in sound land use planning efforts.
- As a participant in many federal land agency planning processes and as an observer of state planning efforts involving natural resource

- allocations, I have found only the State to balk at any sense of professionalism in its concern for values other than development of natural resources. I have seen countless incidents of DWR recommendation by biologists lost in the Department of Natural Resources' recommendation to the State, followed by a further filtering of that department's recommendation by the State of Utah. The accepted practice by state planning efforts is to ignore the wildlife, parks and non-development departments of state government in favor of full development of our finite resources, here the water resources of the White River. DWR, dependent upon sportsmen licenses for two-thirds of its funding, has no chance in impacting decisions by its fellow agency, the Division of Water Resources, in this case, a borrowing of \$18 million to destroy the wildlife and habitat it is the former agency's charge to protect.
- 15.8 Since oil shale development is in its early development stages, I feel a better use of water would be portable (trucked) sources until more is known of the requirements of such a massive energy retrieval effort.
- 15.9 As currently planned four companies and evaporation would consume nearly one half of the average yearly flow, reducing the river and projected reservoir to a sad remnant of itself. And that is based on average flow-- on low years the draw down would be beyond disastrous, if such a state exists. This is public water and any comments in my statement and others' must be given as full attention as those received by those whose dollars and frantic patriotism speak with higher emotionality.
- 15.10 Where are the alternatives allowing for only those most water efficient companies to be granted use? Where are alternatives other than full scale development on a commercial basis? What of the recreational potential for the White? We know the existing uses-- canoeing, hiking, enjoyment of a wild, unique river, and the native people's uses of the river, as varied as they are. What of wildlife values? I had hoped to see those values addressed here.
- 15.11 I offer NO ACTION, Alternative #2, as the only viable alternative until the above concerns are solved, with full public hearings, comment periods and input. Issuance of permits to withdraw water to construct the dam, in essence to destroy the riparian habitat and ignore the Ute Indian designs for water use, is unacceptable until the State of Utah establishes a reasonable board of planning, not unlike a Utah Environmental Protection Agency or Division of Environmental Affairs-- the current Department of Natural Resources doesn't reflect the environmental concerns for land use, only energy targets and leasing/permitting of development action.
- The various task forces of the Agenda for the Eighties addressed these concerns-- and public reaction to those final reports was single-minded: the State of Utah should lend full attention, be legislatively and through mitigation, to an adequate environmental planning effort for future Utah projects affecting our diverse natural resources.
- The White River is a classic example of poor state planning and must be corrected before the issuance of a final EIS. Selectively

15.11  
(cont.)

denying development-- not unlike granting selective developments-- of Utah's natural resources is not unreasonable. Denial of Multiple Use is. This action by the state is an example of why the Sagebrush Rebellion will never succeed: the state cannot prove it is capable of offering equitable decisions for all parties involved in land allocation matters. If only the development "side" is favored consistently, there is little hope for those of us who have nothing to offer but desire for a wise use of our natural resources, not the power of purchase of federal lands offered to the state to be sold to the highest bidder. The state cannot handle this massive task. Unfortunately, the White River project is too perfect an example.

I appreciate this opportunity to comment on the future of the White River.

*Margaret Pettis*

Margaret Pettis  
1384 South 600 East  
Salt Lake City, Utah 84105

cc: Governor Matheson

15.1 See the revised Recreation sections of Chapters 3 and 4 in this Final EIS regarding the White River's potential for wild and scenic river designation.

Regarding the intrusion restriction you propose, the canyon has been designated as a Visual Resource Management Class II area by the BLM. This means that proposed activities (construction, etc.) in the area should not be evident in the characteristic landscape. A contrast may be seen but should not attract attention (Appendix 8). This visual management objective would not be met by the proposed dam or Alternative 3. The Draft EIS recognizes on page 103, Unavoidable Adverse Impacts, that 995 acres of riparian vegetation would be lost to the dam and reservoir and an unquantifiable amount would be lost or modified below the dam on 4,575 acres. The Draft EIS did not state or infer that this vegetation would be duplicated or the loss mitigated. However, some mitigation would occur based on a mitigation plan for those items listed in Appendix 10.

15.2 Many design and construction features of the proposed dam and reservoir were not included in the Draft EIS. Final approval for the dam design and safety features would be given by Utah State Division of Water Rights (State Engineer). The U.S. Army Corps of Engineers (who must review and give a 404 Authorization permit) and the Bureau of Land Management (who must approve the land use) are concerned with dam safety. The final certification for dam safety, however, must be given by the Utah State Engineer.

15.3 Threatened, endangered, and sensitive fish species found in the White and Green Rivers are included in Chapter 3, pages 66-67 of the Draft EIS, as part of the affected environment. Impacts to these fish are considered in Chapter 4, pages 110-111. The FWS has conducted a study on the White River in Utah and Colorado (funded by the BLM) for the purpose of filling data gaps concerning these endangered species and their habitat. An official Biological Opinion from the FWS is included as Appendix 4 in this Final EIS.

15.4 We agree that members of the Ute Indian Tribe located in northeastern Utah should be completely informed of project proposals and the environmental consequences should the project be constructed.

The Bureau of Land Management has involved the Ute Indians by inviting them to scoping meetings, interagency reviews of the preliminary Draft EIS, and public hearings. They have attended some of these meetings and have provided their views on the proposed White River Dam Project. In addition, the Utah Division of Water Resources has been and currently is working with the Tribe to solve problems concerning water needs and downstream requirements. There is some Ute Indian land in the proposed reservoir area. The Tribe has participated in the EIS process and there has been active communication with the Indian people. See Letter Comments and Responses 49.1 and 60.1.

15.5 The EIS is limited to analyze project impacts on the surrounding environment. In preparing the EIS, the BLM assumed that the proponents (Utah Division of Water Resources) completed sufficient analysis of the project to satisfy taxpayers of its cost efficiency. A rough estimated cost analysis compares alternatives in Appendix 6 in this Final EIS.

Energy and water sales are expected to pay for the cost of the project in about 20 years; therefore, the cost benefit appears sound for a project of this type. See also Comment Letter 17.1 from the Federal Energy Regulatory Commission.

- 15.6 All of the animals you mention have been taken into consideration and evaluated from a standpoint of significance. For instance, the impacts of the project to such species as deer mice, wandering garter snakes, or blue bellied lizards are not as significant as impacts to species such as beaver, deer, or Canadian geese. Only the significant impacts are addressed in the EIS; however, all species were considered at some point in the preparation of the document.
- 15.7 As stated in Chapter 4, Recreation section, the quality of fishing and boating resources in the proposed reservoir would be questionable. For new information about canoeing and rafting, see the revised Recreation sections of Chapters 3 and 4 in this Final EIS. Also, see the revised Cumulative Impacts section in Chapter 4.
- Planning by public/government agencies recognizes the need for providing a variety of recreational opportunities based on resource potentials, values, and limitations within the Uinta Basin. Your concerns on ORV and non-motorized recreation are noted.
- 15.8 Water required for pilot mining or retorting of oil shale might be trucked from its source to the area of use. Full-scale operations of the White River Shale Project, for example, would require about 28,000 acre-feet of water annually. This quantity of water could not be adequately conveyed by truck.
- 15.9 Based on annual average flows from the White River, the Utah Board of Water Resources filed for a water right of 250,000 acre-feet in May 1965. The proposal is to develop, by dam and reservoir, active storage capacity for 75,000 acre-feet of water, not the total 250,000 acre-feet. The annual average discharge of the White River is approximately 502,800 acre-feet each year (based on 50 years of data). The 75,000 acre-foot annual water depletion would be about 15 percent of the average river flow. In Appendix 3, page 163 of the Draft EIS, it states that 250 cfs (or the natural flow of the river if less than 250 cfs) would be the minimum water released through the dam so the stream would not be reduced to a "sad remnant of itself," most of the time. See Appendix 3 of this Final EIS for additional flow criteria.
- You are correct: this project is using public waters. In Utah the public waters are managed and appropriated to users by a public agency (Utah Division of Water Rights [State Engineer]). Further, the Utah Division of Water Resources (proponents of this project) has the responsibility to plan for wise and beneficial uses of water in the State of Utah.
- 15.10 The alternatives you mentioned were not proposed by the applicant or identified by the public in the EIS scoping process. BLM selected those potential alternatives that were considered most feasible. Granting use to the most water-efficient companies is state policy which would be pursued with any of the alternatives used in this EIS.

- 15.10 (cont.) The Heritage Conservation and Recreation Service's final Mid-Continent Inventory List released on February 20, 1981, included the White River segment from the Colorado-Utah state line to the Green River as eligible for inclusion in the Wild and Scenic Rivers System. That listing is based on the essentially free-flowing character of the river and recreational opportunities and wildlife values present.

The diverse combination of resource features and values found in the White River Canyon are rare in the Intermountain West. The Canyon possesses quality riverine values and recreation potentials. High scenic quality is also found along the river and its side canyons. The canyon offers opportunities for viewing beaver, nesting geese, mule deer, song birds, and raptors. See also the Recreation section in Chapter 3.

- 15.11 The views expressed will be considered in the decision-making process. Your concerns regarding State land use and planning are also concerns of multiple-use planning. The State Constitution and Supreme Court decisions require State (school sections) lands to be managed for the highest revenue, thus precluding wildlife and wilderness values in favor of development. However, other state agencies place emphasis on use of natural resources for wildlife and recreation.

## Comment Letter 16

RICHARD D. LAMM  
Governor



J. A. DANIELSON  
State Engineer

### DIVISION OF WATER RESOURCES

Department of Natural Resources  
1313 Sherman Street - Room 816  
Denver, Colorado 80203  
Administration (303) 838-3581  
Ground Water (303) 839-3587  
January 28, 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
170 S. 500 East  
Vernal, Utah 84078

Re: White River Dam Project

Dear Sir:

We appreciate the opportunity to review and comment on the above Project and Draft Environmental Impact Statement with respect to its impact on Colorado and water resources of the Basin. The State of Utah proposes to use a portion of its allocation of compact water under the conditions of the Upper Colorado River Compact for the White River Dam Project. We do not have any objections to the project and draft statement provided water development under the plan does not conflict with the Upper Colorado River Basin Compact.

Very truly yours,

*Hal D. Simpson*  
Hal D. Simpson, P.E.  
Assistant State Engineer

HDS/JMS:pk

cc: Wes Signs, Div. Eng.

## Response Letter 16

- 16.1 Agreements between the States of Utah and Colorado under the Upper Colorado River Basin Compact are beyond the scope of this EIS and outside the jurisdiction of the BLM.

# Comment Letter 17

## FEDERAL ENERGY REGULATORY COMMISSION

WASHINGTON, D.C. 20426

In Reply Refer To:

DEPR-DHRA  
Cooperative Studies  
Draft Environmental Impact Statement  
White River Dam, Utah

1000 2-5 1000

Mr. Lloyd Ferguson  
District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Dear Mr. Ferguson:

This is in response to your recent request for our review and comments on the Draft Environmental Impact Statement for the White River Dam Project, Utah.

The proposed White River Dam project would be constructed and operated by the State of Utah. It would consist of an earth and rockfill structure about 129 feet in height. The dam would be constructed on public lands about 40 miles southeast of Vernal, Utah on the White River, a tributary to the Green River which is a major tributary to the Colorado River. The reservoir would provide an active storage capacity of about 67,000 acre-feet which would enable regulation of discharges required for oil shale development. The proposed project would also include a 5- to 8-megawatt (MW) hydroelectric plant, a power transmission system, recreation facilities, and access roads.

- 17.1 We have reviewed the report to determine potential effects on the Commission's responsibilities under the Federal Power Act, Natural Gas Act, and other authorities. Such responsibilities relate to the licensing of non-Federal hydroelectric projects, participation in the planning of Federal water and power projects, and regulation of construction and operation of natural gas pipeline facilities.

We have analyzed several alternative power installations. Our studies indicate that, if the powerplant and other related structures are evaluated as incremental features to the reservoir project, a powerplant with an installed capacity of about 8-10 megawatts would be economically feasible. Our computations were based on the assumption that the water supplies needed for oil shale development, amounting to about 97 cubic feet per second, would be discharged downstream

-2-

- 17.1 (cont.) through the hydropower plant. Our economic analysis utilized a project life of 50 years and 10 percent financing of both the hydropower project and an assumed coal-fired steam-electric alternative. Although we did not perform a load-resource study in great depth, there appears to be little question as to the ability of project output.

- 17.2 We believe that the report contains an error or misleading statement on page 9 in stating that the U. S. Geological Survey gage data for the White River at Watson indicates that the water for energy development could be taken directly from the river by constant pumping in all but one of 50 years, while still maintaining the minimum required 250 cubic feet per second in the river for downstream uses. This conclusion could only have been reached on the basis of annual average flow analysis. Our study of monthly data for the Watson gage indicates that discharges of less than 250 cubic feet per second occur 5 percent of the time and that discharges of less than 350 cubic feet per second have historically occurred more than 20 percent of the time. Our analysis also reveals that in order to meet the 97 cubic feet per second for the synfuel plant and the 250 cubic feet per second for downstream requirements, regulation would be required nearly every year.

Based on its consideration of the reports of your office and our studies, we conclude that the proposed White River Dam Project provides an opportunity for the economical development of about 8-10 megawatts of hydroelectric power. More detailed studies may show that the most desirable installation would be slightly different.

Sincerely,

*William M. Lindsay*  
William M. Lindsay, Director  
Office of Electric Power Regulation

## Response Letter 17

17.1 The views expressed will be considered in the decision-making process.

17.2 The analysis of water requirements and flow data was based on average annual flow. The monthly flow was also studied. The commitment to leave 250 cfs as minimum flow is made based on average flows. However, it is also stated in Appendix 3 that, except for a 5,000 acre-foot augmentation as directed by the FWS Biological Opinion, minimum flows would not guarantee anything above that provided by nature. As you point out, there are periods of time when flows drop below 250 cfs. The basis for the White River Dam Project is that, to meet the 97cfs requirement for synfuels development, some water storage from the White River or augmentation from the Green River would be necessary nearly every year. See also Appendices 4 and 10 in this Final EIS.

## Comment Letter 18

FEB, 3, 1981

DIST. MANAGER

DEAR SIR:

18.1

I RECOMMEND THAT THE BLM ADOPT  
ALTERNATIVE Z: NO ACTION, UNTIL OIL SHALE INDUSTRIES  
WATER NEEDS ARE DETERMINED AND FURTHER ADVANCED.  
ALSO, A MASTER PLAN FOR THE WHITE RIVER IS  
DEVELOPED AND ALTERNATE SITES INVESTIGATED.  
THANK YOU, IN ADVANCE.

YOURS TRULY,  
*Larry Hopkins*

## Response Letter 18

18.1 The views expressed will be considered in the decision-making process. For information about alternative dam sites, see the Introduction to Chapter 2 and Figure 2-2 of this Final EIS.

BLM cannot resolve differences or enforce agreements on water issues between Utah and Colorado. Please see the revised Chapter 1, Purpose and Need section, for new information about oil shale industry water needs.

## Comment Letter 19

*Regarding White River Dam Project*

19.1

*I recommend that BLM adopt Alt 2  
permits should be denied until  
oil shale industries water need are  
determined + alternate dam sites investigated*

*Harley King  
P.O. Box 2020  
Burlington, VT 05400*

## Response Letter 19

- 19.1 The views expressed will be considered in the decision-making process. For information about alternative dam sites, see the Introduction to Chapter 2 and Figure 2-2 of this Final EIS. See also Letter Response 18.1.

## Comment Letter 20

MILTON HOLLANDER  
2561 VALLEYVIEW AVE.  
SALT LAKE CITY, UTAH 84117  
FEBRUARY 3, 1981

DISTRICT MANAGER  
BUREAU OF LAND MANAGEMENT  
170 SOUTH FIFTH EAST  
VERNAL, UTAH 84078

DEAR SIR :

SUBJECT : WHITE RIVER DAM PROJECT

I HAVE REVIEWED THE E.I.S. REGARDING THE WHITE RIVER DAM PROJECT, AND ALSO ATTEMPTED TO DISCERN AT WHAT POINT RELATED TO ACTUAL OIL PRODUCTION IS UTAH'S OIL SHALE DEVELOPMENT. ONE COMPANY, GEOKINETICS INC., IS PRODUCING SMALL QUANTITIES OF OIL USING AN IN SITU METHOD REQUIRING LITTLE WATER.

BASICALLY UTAH OIL SHALE DEVELOPMENT IS STILL IN THE RESEARCH AND DEVELOPMENT PHASE. A SCALED UP WORKABLE PLANT IS YET TO BE PLACED ON LINE IN UTAH'S OIL SHALES. ASSUMING A FULL SCALE PLANT WAS CONSTRUCTED IN THE NEXT THREE YEARS, SHAKE DOWN AND DEBUGGING COULD EASILY CONSUME SEVERAL MORE YEARS. THE COST EFFECTIVENESS OF SUCH AN INSTALLATION WOULD TAKE SEVERAL MORE YEARS. NATIONAL LEAD ON THE GREAT SALT LAKE IS AN EXAMPLE OF HOW LONG IT CAN TAKE FOR A PLANT (NOT OIL SHALE) TO BECOME COST EFFECTIVE.

20.1 PLANS TO DAM THE WHITE RIVER FOR THE PURPOSE OF IMPOUNDING WATER FOR OIL SHALE DEVELOPMENT SEEM PREMATURE AT THIS TIME. PREMATURE DAMING WOULD LEAD TO PREMATURE SILTATION AND REDUCE THE ACTUAL USABLE RESERVOIR STORAGE AS RELATES TO TIME OF NEED.

THE WATER NEEDS FOR THE FIRST FULL SCALE PLANT SHOULD NOT JEOPARDIZE THE WATER AVAILABLE FOR SUBSEQUENT PLANTS. SINCE WATER IN THE OIL SHALES AREA IS IN SUCH SHORT SUPPLY, OIL SHALE DEVELOPMENT SYSTEMS LESS DEPENDENT ON WATER SHOULD BE ENCOURAGED.

RECENT OIL DEVELOPMENTS IN THE OVERTHRUST BELT MAY PROVIDE TIME TO PERMIT A MORE OBJECTIVE APPROACH TO OIL SHALE DEVELOPMENT RATHER THAN ONE PROMPTED MORE BY NEAR HYSTERIA.

INCIDENTALLY I HAVE CANOED THE WHITE RIVER SECTION WHICH INCLUDES THE PROPOSED DAM AND IMPOUNDMENT. MY WIFE AND I ALONG WITH TEN OTHERS THOROUGHLY ENJOYED THE EXPERIENCE. WE WERE SADDENED BY THE KNOWLEDGE THAT ONE MORE OF AN EVER DIMINISHING PRIMITIVE AREA MAY BE ABSORBED TO FURTHER OUR CONSUMPTIVE LIFE STYLE.

AT THIS POINT IN TIME I OPT FOR ALTERNATIVE 2: NO ACTION. THANK YOU.

RESPECTFULLY YOURS,  
Milton Hollander

20.1 The views expressed will be considered in the decision-making process. See the revised Chapter 1, Purpose and Need section, of this Final EIS.

## Comment Letter 21



### American Fisheries Society

#### BONNEVILLE CHAPTER

1595 W. North Temple  
Salt Lake City, Utah 84116

January 28, 1981

Mr. Lloyd H. Ferguson  
District Manager  
Vernal District Office  
Bureau of Land Management  
170 S. 500 East  
Vernal, Utah 84076

Dear Mr. Ferguson:

The Bonneville Chapter of the American Fisheries Society is an organization of professional fishery biologists and other concerned individuals which actively encourages the conservation and protection of Utah's native fishes. The Chapter's concern for these unique forms of aquatic wildlife and their habitats is well expressed in its formal position paper entitled "Bonneville Chapter American Fisheries Society Position Paper Regarding Species that are Threatened, Endangered or of Special Concern," a copy of which is attached for your information.

The Chapter is presently concerned about the effect of the White River Dam on four fish species native to the Upper Colorado River Basin -- Colorado squawfish (*Ptychocheilus lucius*), humpback chub (*Sil a cypha*), bonytail chub (*G. elegans*) and razorback sucker (*Xyrauchen texanus*). The first three species are listed as endangered under the requirements of the Endangered Species Act of 1973, as amended. The razorback sucker was proposed for listing as threatened, but the proposal was withdrawn as required by the 1978 amendments to the Act.

- 21.1 The importance of the White River as habitat for these species is still unknown. As reported in the draft Environmental Statement, several subadult and adult Colorado squawfish have been collected in the Utah portion of the White River. In addition, three juvenile Colorado squawfish were collected in the White River near the dam site during fall 1980 by the U.S. Fish and Wildlife Service. The significance of these recent collections is not yet known. However, they may indicate limited reproduction by this species in the White River. This must be investigated further before the impact of this project can be completely determined.

Predicted depletions of 70,000 acre-feet per year from White River Dam amount to 6.7 percent of the lowest flow and 2.2 percent of mean annual flow of the Green River near Jensen, Utah. Although the effect of this project on the Green River, where all four species are known to occur, may appear to be small, the cumulative effects of all water development in the basin will be great. Water and Power Resources Service and the Colorado Department



Mr. Lloyd H. Ferguson  
January 28, 1981  
\*Page Two

of Natural Resources predict total water requirements for energy development by the year 2000 to amount to as much as 72 percent of the low flow and 24 percent of the average flow in the Green River. The U.S. Fish and Wildlife Service is presently conducting an investigation of the flow requirements of the rare fish in the Green River. This information will help determine the effect of water depletions from the Green River on these rare fish.

- 21.2 The Bonneville Chapter supports the Utah Division of Water Resources and Bureau of Land Management in initiating studies on the White River and urges you to wait for that additional biological information before proceeding with the project.

Sincerely,



William Geer, President  
Bonneville Chapter, AFS

Enclosure

cc: Governor, State of Utah  
Utah Division of Water Resources

BONNEVILLE CHAPTER AMERICAN FISHERIES SOCIETY  
POSITION PAPER REGARDING SPECIES THAT ARE THREATENED  
ENDANGERED OR OF SPECIAL CONCERN

February 3, 1978

INTRODUCTION

Geological and climatological change in the Great Basin has resulted in the evolutionary development of a number of unique species. Many of these species have become threatened and some extinct as a result of man's activities.

Settlement of the West began over 100 years ago and was dependent upon the development of water resources. Development of these resources caused alterations of much of the native aquatic habitat. Until recently, developers have shown little concern for the species whose life cycles they were disrupting. In addition, exotic species were introduced that competed with the native species. Several fish have been listed by the U.S. Fish and Wildlife Service as "endangered" and several others have been submitted for listing by concerned biologists. Still other species that are found in limited areas or are in limited numbers are of special concern to biologists in State and Federal agencies.

The Federal Government published the Red Book of Endangered Wildlife in 1964 and acknowledged a national responsibility to save resident native species of wildlife that were threatened with extinction by enacting the Endangered Species Preservation Act of 1966. This Act was basically amended into the Endangered Species Conservation Act of 1968, which broadened the scope of the Federal Government to preserve and manage endangered species. The current Endangered Species Act of 1973 (1) was the most significant legislation by the Federal Government to protect and manage endangered species. This act provides for cooperation between the Federal Government and the states in conservation of listed species (Section 6). It also provides guidelines for defining threatened or endangered species and procedures for listing them (Section 4), and for an orderly method of issuing permits for scientific study (Section 9).

The Utah State Division of Wildlife Resources was among the first state agencies to provide protection not only to threatened and endangered species, but also to species deemed by the State to be of special concern. Utah has worked, as have the other western states, to uphold the intent of the Endangered Species Act.

The American Fisheries Society, the largest and oldest active international professional society in the western hemisphere, has among its objectives the conservation of aquatic resources. The Endangered Species Committee of the Society began in 1971 to enlist the support of State and Federal agencies in preparing and maintaining an endangered species list (2), an endeavor which continues today.

The Bonneville Chapter of the American Fisheries Society formed a Threatened Fishes Committee following the enactment of the Endangered Species Act. In 1974, this committee compiled a list of species of special concern (3). This committee has remained active in encouraging State and Federal agencies to consider protection of the habitats of threatened and endangered species.

POSITION OF THE BONNEVILLE CHAPTER AFS

The Bonneville Chapter compliments the State of Utah for its efforts at protecting its aquatic fauna and acknowledges that it is the responsibility of the state to conserve its wildlife resources. The Chapter encourages the State of Utah, and cooperating Federal agencies, to continue their efforts to protect aquatic ecosystems, especially those of species which are threatened, endangered, or of special concern. These agencies are encouraged to provide staff positions for biologists, needed to perform research and make management recommendations on the organisms and their ecosystems.

The Bonneville Chapter AFS strongly supports the protection of natural habitats so that native fish can survive as species. The Chapter supports the states responsibility for all fish species and State and Federal responsibilities for species that are threatened, endangered, or of special concern, even though they may not be of any significant economic importance and may not be known to the general public. Any agency, whose projects may jeopardize the continued existence of any threatened or endangered species, has the responsibility to demonstrate that the project will not be detrimental to that species. Furthermore, the Bonneville Chapter AFS opposes the development project that may endanger any species.

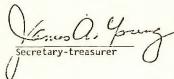
The Chapter supports the principles of the Endangered Species Act of 1973, and encourages Federal agencies to actively implement the provisions provided in Section 7. The U.S. Fish and Wildlife Service is encouraged to cooperate with the State of Utah to consummate a cooperative agreement that will provide the necessary funding for research and management of threatened and endangered species as provided in Section 6.

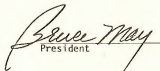
The Chapter recognizes that problems arise from specific language in the Act. Section 4e states that the Secretary of the Interior may treat many species as threatened or endangered if it closely resembles an endangered species and inhabits the same area. The Chapter feels this concept, as well as the procedures for determining the status of species, allows too wide a latitude for determining the species to be protected. The broad definition of "take" in Section 9 poses some problems in interpretation of Section 9. The Chapter supports close coordination and cooperation, these problems in the Act can be overcome and provide adequate protection and enhancement of species that are threatened, endangered, or of special concern.

SUMMARY

Several fish species have been reduced in numbers and range because of man-induced alterations to their habitat. It is the position of the Bonneville Chapter AFS to protect such species that are considered as threatened, endangered, or of special concern, through the protection and maintenance of natural ecosystems needed for the survival of these fish species. The Chapter supports the Endangered Species Act of 1973 as a workable tool for State and Federal cooperation in the management of such species. The Chapter will evaluate specific cases when needed. This position is amendable by due process of the Chapter.

ATTEST:

  
Secretary-treasurer

  
President

REFERENCES

- (1) U.S. 93rd Congress. 1973. Endangered Species Act of 1973 - Public Law 93-205. Senate and House of Representatives of the United States of America Congress, 93rd Congress, December 28, 1973.
- (2) Miller, R.R. 1972. Threatened Freshwater Fishes of the United States. Trans. Am. Fish. Soc. 101(2): 239-252.
- (3) Holden, P.B., W. White, G. Somerville, O. Duff, R. Gervais, and S. Gloss. 1974. Threatened Fishes of Utah. Proc. Utah Acad. Sci., Arts, Lett., Proc. 51 (Part 2): 46-65.

- 21.1 See Appendices 4 and 10, FWS Biological Opinion and Technical Assistance Report in this Final EIS for new information regarding endangered fish species.
- 21.2 The formal Biological Opinion from the FWS is included as Appendix 4 in this Final EIS. Additional biological information is presented in the Technical Assistance Report, Appendix 10.

# Comment Letter 22



**PHILLIPS PETROLEUM COMPANY**  
BARTLESVILLE OKLAHOMA 74004 800 651-6666

February 2, 1991

Mr. Donald L. Pendleton  
District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, UT 84078

Please Reference: 1792

Dear Sir:

On October, 1980, the Bureau of Land Management issued a Draft Environmental Impact Statement (EIS) on the proposed White River Dam Project. Phillips Petroleum Company appreciates the opportunity to comment on the Draft EIS and trust our input will be given due consideration in the preparation of the Final EIS.

Phillips Petroleum Company is partner in the White River Shale Project (WRSP), a joint venture with Sunoco Energy Development Company and Sohio Shale Oil Company. WRSP is located on Federal Prototype Oil Shale Lease Tracts Ua and Ub which are adjacent to and south of the proposed White River Dam and reservoir. Our project is one of several users of water to be supplied by the proposed dam.

- 22.1 There is a definite need to develop water resources in the Uinta Basin in the most expeditious manner possible. Even though energy projects in the region are still in their formative stages, steps must be taken now to begin construction of the White River Dam such that a dependable source of water is available when the oil shale industry begins production.

## 1. Need for Water Resource and Energy Development

In the Draft EIS, Alternative 2 (No Action) does not fully discuss the implications of not providing water for use in energy development. Growth of an energy industry would be severely restricted if not entirely thwarted by the lack of an available water resource. The State of Utah contains a large share of the oil shale deposits found in the United States. It also contains rich seams of oil sands and coal. The development of these energy resources could

## 22.1 (cont.)

contribute significantly to our nation's goal of energy independence. Water provided by the White River Dam could sustain the needs of a growing energy industry thereby improving our nation's energy posture as well as satisfying regional needs. At a time when our nation dangerously relies on interruptable foreign supplies of crude oil for over 40% of its requirements, we consider development of secure domestic supplies to be paramount. To restrain development of Utah's vast energy resources by limiting water supplies will jeopardize America's way-of-life and national security. In our opinion, the residents of the Uinta Basin support energy development. This conclusion was substantiated in a survey by Wasatch Opinion Research in 1980 as part of the Uinta Basin Oil Shale Impact Study being funded partially by the Department of Energy (DOE). Consequently, Alternative 2 (No Action) is not a viable alternative.

## 22.2

### 2. Utah Water Rights

The State of Utah is presently under-utilizing existing water rights and water allocations under the Upper Colorado River Compact. The proposed White River Dam would in fact conserve a resource for local use (and improvement) that would otherwise flow away during high runoff periods. The proposed White River Dam will afford the State of Utah the opportunity to develop a part of its Colorado River Compact water allocation and retain a valuable water resource that has been allowed to flow past the region to date.

## 22.3

### 3. Mineral Resource Availability

It is stated, as fact, throughout the document that large areas of oil shale resource would be unavailable for recovery due to inundation by the reservoir. We find it strange for the EIS to even suggest the reservoir would reduce the recoverable oil shale reserves, when in fact, several major oil shale projects may not even be built without the water the reservoir would supply. The statement that oil shale would not be available on 1,860 acres inundated by the reservoir may or may not be true. Mining takes place in many areas of the world under much larger bodies of water (i.e. under the Atlantic Ocean and Lake Erie). In fact, there is reason to suggest the overlying sandstones would break down in the presence of inundation and provide material to seal off existing joints and bedding planes. Thus, large fissures (if they exist) could be grouted off. Based on other mining operations under bodies of water, the most probably scenario would favor full resource utilization.

## 22.4

### 4. Recreational Opportunities

As a direct result of construction of the White River Dam, recreational opportunities not currently available to residents and visitors in the Uinta Basin would be created. Fishing at the proposed Dam site is currently limited to an occasional

22.4  
(cont.)

Channel Catfish. The White River Dam, if built, would provide the necessary environment for the establishment of both a cold water fishery (below the dam) and a warm water fishery in the reservoir itself. Since fishing is the most frequently engaged in outdoor recreation activity by residents of the Uinta Basin, the development of such a resource from the currently limited and little utilized existing river fishery would be beneficial. Other recreational opportunities not currently available in that local region would be created and include boating and all types of related water sports, plus the establishment of camping facilities. The reservoir would literally be an oasis in the midst of what is now a very arid region.

22.5

#### 5. Wildlife Impact

Throughout the EIS, references are made to "losses" of various numbers of animals due to inundation by the reservoir. The term should actually be applied to a "loss" of that animals habitat, which does not always imply the loss/death of the animal. The mobile species will be able to relocate and find suitable alternative habitats.

It is even possible that the proposed White River Dam could provide a suitable habitat for the Colorado Squawfish, if this fish does exist in the White River near the reservoir.

22.6

#### 6. Energy Analysis

The White River Dam Alternative is the least energy intensive means of providing water to the Uinta Basin. It is the only alternative that instead of requiring energy for annual operation, would be a direct producer of hydroelectric power of up to  $9.9 \times 10^{10}$  BTU/Yr. This translates into the equivalent of 41.2 million lb/yr of Western coal production which otherwise would have to be burned in a power plant. In contrast, Alternative 3 (Pumping from the Green River) consumes the equivalent of 200.0 million lb/yr of Western coal for annual operation. There are, of course, air pollution emissions associated with coal combustion that the EIS fails to recognize.

In addition to these key areas of concern, there were other areas in the EIS that require attention.

22.7

- \* It should be noted on pages 1 and 5 that "White River Shale Corporation," a division of Fedco Tract UG, has fully assigned its interest in the White River shale Project to Sohio Shale Oil Co.

22.8

- \* On page 42, the figure given under Alternative 1 (White River Dam) Energy Analysis (B. Annual Operation) is incorrectly stated as  $9.9 \times 10^9$  and should be  $9.9 \times 10^{10}$  BTU produced.

Again, Phillips Petroleum Company appreciates the opportunity to comment on the White River Dam Draft Environmental Impact Statement issued by the Bureau of Land Management and wishes to support Alternative 1; Construction of the White River Dam and reservoir at an early date.

Sincerely,

*C. A. Wentz*

C. A. Wentz  
Manager,  
Oil Shale/Oil Sands

CAW:SSD:sa

# Response Letter 22

- 22.1 The views expressed will be considered in the decision-making process. Your concerns relative to the No Action Alternative are discussed in this EIS. The No Action Alternative recognizes that, "The present trends in the Uinta Basin indicate continued and increased development of energy resources, greater need for water (even though technological advances may tend to reduce volumes of water needed for energy development)." It further states "The No Action Alternative could be applied for a short time or a long, indefinite period."

The No Action Alternative is also required by CEQ regulations and is intended to provide information which may postpone major commitments of resources at this time so that conflicts between energy needs and environmental values can be further studied, for example, the No Action Alternative was temporarily selected in the Draft EIS to allow the FWS to conduct studies and issue a Biological Opinion on endangered fish.

An Upper Colorado River Basin Assessment (Colorado Department of Natural Resources 1979) concludes that the specific water resource requirements of energing energy technology projects are not definitely known. However, there are a number of water supply alternatives available which include: development of surface supplies, such as on the Green River, especially conditional surface water rights already owned by energy corporations; possible purchases of surface water rights from existing agricultural users on now vacant lands; development of limited groundwater; and improvements in the efficiency of existing water uses.

- 22.2 Your comments in support of Alternative 1 to construct the White River Dam and Reservoir will be considered in the decision-making process.

- 22.3 The acreage figure for reservoir inundation has been revised to 1,980 in this Final EIS.

It is recognized that mining operations can take place under bodies of water. However, initial geologic reports on the area questioned if mining would be feasible under the reservoir area due to water seepage through fractures and joints. Since publication of the Draft EIS, Bingham Engineering (1981a) has completed an investigation of the dam site and reservoir area. That study indicates that one or two small portions of Tracts 14a and 14b under the reservoir would probably not be mined; therefore, there would be some loss of oil shale recovery for the life of the project. This loss is considered small in relation to the volume of recoverable oil shale (Bingham Engineering, 1981a). Also, see letter Response 27.4.

- 22.4 As noted on pages 112 and 113 of the Draft EIS, the potential cold and warm water fisheries could be of low quality but would offset the loss of the limited channel catfish fishery; however, the FWS Biological Opinion precludes the development of any cold water fishery. The present quality of canoeing and rafting would be reduced in the reservoir area. The reservoir would create an attractive area for power boating; however, during fall turnover, gas releases (hydrogen sulfide) could make it less attractive for boating and related sports activities.

- 22.5 Losses of wildlife are the final impact from the proposed action. Loss of habitat is an intermediate impact. Loss of habitat does not

- 22.5 always cause a loss of animals, provided there are suitable alternative habitats available. However, with the proposed White River Reservoir, inundation of the riparian zone and loss of the river characteristics would leave little, if any, available habitat in which the niches (homes) are not already occupied. Some mitigation is possible by improvement of habitat elsewhere.

In the case of the Colorado squawfish, rivers, not reservoirs, are needed for its continued existence.

- 22.6 Commonly accepted conversion factors indicate that the average short ton of Western coal is equivalent to 21,000,000 Btu and a kilowatt hour (kWh) of electricity is equivalent to 3,413 Btu. On that basis the estimated 29 million kWh that would be produced annually by the hydroelectric plant would equate to approximately 9.4 million lb/yr or 4,700 short tons of Western coal, not 41.2 million lb/yr as you stated.

Using the same conversion factors, the energy consumed annually by operation of Alternative 4, pumping from the Green River, would be equivalent to approximately 44.5 million lb/yr or 22,250 short tons of Western coal, not the "200.0 million lb/yr".

For purposes of comparison, 4,700 tons of coal would constitute 0.3 percent of the annual coal requirements of a 800-megawatt generating plant. Similarly, 22,250 tons would be 1.6 percent of the annual requirement.

However, in a comparison of the operational energy requirements, the proposed White River Dam (Alternative 1) would be favored.

Regarding the comment about air pollution emissions, because none of the alternatives addressed in the Draft EIS involved coal combustion processes and because other emission sources (i.e., vehicles) were of small magnitude, there was no need to discuss air pollution impacts.

- 22.7 The text of this Final EIS has been revised as requested.

- 22.8 The text has been revised in this Final EIS to  $1.1 \times 10^{11}$  Btu per year based on an annual 31.4 million kWh generated from the power plant.

Comment Letter 23

Response Letter 23

2/3/81

Distict Mgrs, Vernal District  
BLM  
170 S. 500 E.  
Vernal, UT 84078

Dear BLM,

I feel you should select Alternative #2, the "no action" alternative, for the White River Environmental Impact Statement.

To build the dam, at this point, seems premature until wildlife, water resource and other ongoing studies are completed. I am deeply concerned that the stretch of the river proposed for inundation will be the victim of poor planning and unnecessary haste in development. The river has tremendous value as a wild area, and I hope alternatives can be found that will preserve it.

Sincerely,

Rob Smith  
Rob Smith

23.1 The views expressed will be considered in the decision-making process. Publication of this Final EIS was delayed until completion of the studies you mention. The FWS Biological Opinion is included as Appendix 4 in this Final EIS.

23.1

Comment Letter 24

Response Letter 24

777 East South Temple  
Salt Lake City, Utah 84102  
February 5, 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Dear Sir:

24.1 The White River Dam Project should not be considered further until much more information is forthcoming concerning oil shale technology, oil shale industries' water needs, and alternative dam sites.

I urge that the Bureau of Land Management adopt Alternative 2: No Action.

Sincerely,

*Jill Sedam*

Jill Sedam

cc.

24.1 The views expressed will be considered in the decision-making process. See the revised Chapter 1, Purpose and Need section and Chapter 2, Alternatives Not Discussed section of this Final EIS for information regarding your concerns.

# Utah Audubon Society

P.O. Box 9819  
Salt Lake City, Utah 84109

February 3, 1981



District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Dear Sir,

The Utah Audubon Society offers the following comments and recommendations on the White River Dam Project Environmental Impact Statement, Draft.

First, the BLM should be commended for a document that is concise and easy to understand. Strong points of the document include: good quantification of impacts (particularly wildlife losses), consideration of potential cumulative impacts, a thoughtful analysis of secondary impacts, excellent visual simulations and good use of summary tables.

Some questions and inadequacies which we would like to see addressed in the Final EIS are as follows:

- 25.1 The Purpose and Need Section should investigate the need for the White River Dam in relation to the oil shale industry's present state of development. The feasibility (in both technological and economic terms) and desirability (in environmental terms) of full scale oil shale production has not yet been proven. The estimates of water requirements are for full scale production, yet pilot development operations have not even started on Tracts 1a and 1b. Industry can meet their demands for pilot programs by pumping water directly from the White River. The figure given for water requirements is estimates not needs. This section should stress this point. The White River Oil Shale Project admits requirements are variable. Furthermore, developments in insitu processing, and advances in the industry itself, could make huge water requirements unnecessary. In addition, the State of Utah's White River Dam Report Public Hearing Transcript (1977) indicated a possible conflict concerning mining claims on oil shale tracts, and noted that the oil shale leases could be invalidated if claims are upheld (p. 11). Has this issue been resolved? The EIS should address the uncertainty surrounding the development of these tracts and assess the true need for the project.
- 25.2 Alternative dam sites, including locations in Colorado, should be considered. Disposal of this alternative, "because the White River Dam site best met the state selection criteria," (p. 2) is inadequate because no where were the environmental impacts of alternative sites analyzed and compared with the proposed site, nor was the selection of a dam site on the White River subject to public comment. Furthermore, state selection criteria would not include the same multiple use considerations as BLM planning would. At the very least, sites that were "acceptable" under state planning criteria were applied should be investigated to see if they have any environmental advantage over the proposed site.
- 25.3 The EIS should contain a section discussing "Alternatives Considered and Omitted." For example, why was groundwater not considered as an alternative to supply water requirements of the oil shale industry? Especially since, "groundwater is relatively common throughout the region," (p. 53, col. 2, para. 4) and, "the potential for recharge

# Utah Audubon Society

Page 2. White River Dam Comments



- 25.3 (cont.) is probably quite high," (p.55, col.1, para.1). If groundwater could be used to develop oil shale on tracts 1a and 1b, this consequence should be more fully addressed in the No Action Alternative Impacts section.
- 25.4 The criteria used to develop reasonable alternatives (p.9, col.2, para. 5) should be 44,000 acre feet delivered to a point accessible to tracts 1a and 1b (i.e., only the oil shale industry's estimated requirements). Evaporative losses (5,500 acre feet) should be excluded because pumping water directly from a river would avoid such a loss. Moon Lake Power Plant (18,000 acre feet) should likewise be deleted because: 1) it is only a potential user, 2) it could meet its demands from alternate sources, and 3) the primary purpose of the White River Dam is to facilitate oil shale development. If this more realistic figure is used, Alternative 3 is a "total" (as opposed to a partial) Alternative.
- 25.5 The estimate of less than 20 parties per year canoeing or rafting the Project Area (p. 69, col.2, para.2) appears extremely low, based on personal experiences of some of our membership. At least 12 canoes (or parties) floated this stretch of the White during the 1980 Labor Day weekend (a time which is not even considered prime in the EIS). Based on current trends, use of a free-floating White River by rafts and canoes would be expected to increase in future years. Timberline Sports (Salt Lake City) reports a near quadrupling of raft, canoe and kayak sales and rentals (as a percent of total sales) between 1976 and 1980.
- 25.6 Because of logistical problems such as put in/take out points, and inadequate downstream flows, canoeing opportunities and quality of canoeing currently experienced would be lost on a much longer stretch of the White River than the 13.5 miles "through the area which would be inundated" (p.51, col.2, para.2; p.113, col.1, para.3; and Table 2-1 on p.42). Minimum downstream flows for canoeing are 300 cfs, while minimum downstream flows released by the Project would be only 250 cfs. Essentially, the stretch of the White River from Rangely to Duray, or 90 river miles, would be made unsuitable for canoeing. It should also be noted that the proposed dam would inundate the most scenic portion in Utah.
- 25.7 Recreational canoeing is ideal during the late summer and early fall as well (p.3, col.1 para.2 and p.68, col.2, para.2).
- 25.8 On Table 4-13 - p. 137, under Recreation's a loss of canoeing along a 90 mile stretch of the White, should be added as an unavoidable adverse impact.
- 25.9 The White River's potential for Wild and Scenic River designation should be discussed.
- 25.10 The invasion of tamarisk downstream of the dam should be listed as an impact. Tamarisk forms virtually impenetrable stands (impeding wildlife and recreationists), is an undesirable wildlife food plant (thereby adversely affecting wildlife habitats and populations), out-competes native riparian vegetation such as willows and cottonwoods (further upsetting the natural ecosystem, and is a phreatophyte (contributing to additional reduced water flows).

# Utah Audubon Society

Page 3. White River Dam Comments



- 25.11 The significance and value of the White River as one of the last major free-flowing tributaries of the Green/Colorado River system should be discussed and impacts analysed in this perspective.
- 25.12 In conclusion, the Utah Audubon Society recommends the selection of Alternative 2, No Action until oil shale technology is further advanced, development of Tracts Ua and Ub is further progressed, real and immediate water needs are determined, and until Alternative dam sites and groundwater potential is investigated. We feel that because of the present uncertainty surrounding the oil shale industry, the considerable impacts to wildlife habitat and populations, loss of wetlands, floodplain and riparian resources (which is contrary to national policy), and the destruction of a limited recreational resource (free-flowing canoeable stream) in Utah is unwarranted.

Thank-you for the opportunity to comment.

Sincerely,

UTAH CHAPTER OF THE NATIONAL AUDUBON SOCIETY

*Richard A. Kirkman, President*  
*James E. Brown*  
*James E. Brown*  
*James E. Brown*  
*James E. Brown*  
*James E. Brown*  
*James E. Brown*  
*James E. Brown*  
*James E. Brown*  
*James E. Brown*

# Utah Audubon Society

P.O. Box 9419  
Salt Lake City, Utah 84109

February 7, 1981



District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Dear Sir,

Since submitting our comment on the White River Dam Project Draft Environmental Impact Statement, we have learned of some additional data that further augment our concerns and support our position. We therefore submit this addendum to our original comments, dated February 3, 1981.

- 25.13 According to Survey Notes November 1980 (a publication of Utah Geological and Mineral Survey, State of Utah - Department of Natural Resources), two geological reports "point up difficulties in the geologic setting of the dam site and reservoir. The proposed dam will be anchored in relatively incompetent, jointed Uinta formation sediments. The extensive joint system of the area may permit leakage of water from the proposed reservoir into mine workings beneath, down dip from, and adjacent to the reservoir floor," p.3.

The Utah Audubon Society submits this information as further evidence that the No Action Alternative should be adopted until alternative dam sites are investigated. Furthermore, these geological questions and the implications (impacts) of siting the dam as proposed should be addressed in the EIS. For instance what impacts will this potential leakage problem have on safety, health and the development of oil shale tracts Ua and Ub? Secondary impacts such as leaching and impacts to downstream users and natural ecosystems should also be investigated.

We request that this statement, together with our original comments of February 3, 1981, be included in the official record and addressed in the Final EIS.

Sincerely,

*Richard A. Kirkman*

UTAH CHAPTER OF THE  
NATIONAL AUDUBON SOCIETY

## Response Letter 25

**25.1** See the revised Purpose and Need section of Chapter 1 in this Final EIS. Please note the revised mining claim quantification found in this Final EIS, Chapter 4, Minerals, Anticipated Impacts section. Revisions to the text concerning the recovery of oil shale resources in the reservoir inundation area can be found under the Unavoidable Adverse Impacts in this same section.

**25.2** Five dam sites were considered by the Utah Division of Water Resources and four were dismissed early during scoping and project development. These sites were proposed in several studies by the White River Shale Project, Bingham Engineering (1969) and VIN Colorado, Inc. (1975). Selection criteria were based on preliminary cost comparisons, location with respect to oil shale development, and structural competence of the foundation of the dam site.

The five sites considered were: Site 1 located about 6 miles downstream from the proposed site; Site 2 located approximately 1 mile downstream from the proposed site; Site 2A - the site chosen for further study and subsequently the proposed site; the U.S. Bureau of Reclamation Watson site about 13 miles upstream from the proposed site; and Site 3 located further upstream near the Colorado-Utah line. (See Figure 2-2 in this Final EIS.) It should be noted that Site 3 is an attractive dam site from the standpoint of storage efficiency. However, it was not considered for further study because it would back water into Colorado and cause some flooding of agricultural lands near Rangely, a situation unacceptable to the Utah Division of Water Resources, the proponents of the dam.

The Draft EIS was not considered to be a dam site selection analysis and did not, in fact, analyze other sites except as noted in the alternatives.

**25.3** It was determined during oil shale studies (VIN Colorado, Inc., 1977) and during Utah Division of Water Resources investigations (1969-76), that very little use was being made of groundwater in the Upper Colorado River Basin. It has been known for many years that the Uinta Basin is a large artesian basin in northeastern Utah. The aquifers are presently in equilibrium, with discharge equaling recharge. However, estimates and investigative studies have not determined total amount of water storage according to the Upper Colorado River Basin Assessment Report to the Water Resources Council (Colorado Department of Natural Resources 1979). Because the groundwater resources are largely untapped, there is a general lack of knowledge concerning their extent and quality. The limited information does show that, even though groundwater is relatively common throughout the region, the quality is poor. Total dissolved solid concentrations measured range from 1,760 mg/l to 4,030 mg/l. The water is a sodium-sulfate bicarbonate type. The high levels of sulfate and hardness would require extensive treatments before the water could be used by industry and, presently, this is not cost effective.

The groundwater alternative was dismissed early in the planning process as discussed in Chapter 2, Alternatives Not Discussed section, in this Final EIS.

**25.4** The 18,000 acre-foot requirement for the Bonanza Power Plant has been dropped because Bonanza's water source is the Green River.

**25.4 (cont.)** There are many changes occurring in the oil shale industry's estimated requirements and needs.

The White River Oil Shale Project has estimated its needs to be about 28,000 acre-feet. Many other companies and potential users have made requests for White River dam water. The Final EIS reflects the current projected needs of these other projects. Changes in projected needs will probably continue to be made until the industry develops. Whatever figures are used, Alternative 3 would probably remain a partial alternative because it would not provide sufficient storage capacity to meet projected needs during drought years.

See the revised Chapter 1, Purpose and Need section in this Final EIS, for the updated list of potential water users.

**25.5** That estimate has been revised in this Final EIS. See the Canoeing and Rafting section under Recreation, Chapter 3.

**25.6** The principal put-in points of Ignatio, Cowboy Canyon, and, occasionally, Rangely, Colorado would still be usable with the reservoir in place. A boat-launching ramp is proposed for Ignatio; mitigation plans call for a take-out point at the dam, and access to the river below the dam is proposed. Therefore, a portage could be made around the dam. The Cowboy Canyon put-in point would be about 2 miles upstream from the upper limit of the reservoir, and the Mountain Fuel Bridge take-out point would still be usable. Thus the river, including the portion in the project area, would still be accessible for canoeists.

Regarding your comments on flows and the effects on canoeing, see the revised Recreation section of Alternative 1, Chapter 4 of this Final EIS.

The Draft EIS notes on page 72, Scenic Quality section, that the project area has been classified as Class A scenery, the highest possible scenic rating. Construction of the proposed dam would create a visual intrusion in this scenic area. The visual simulation on page 15 of the Draft EIS portrays the visual effect of the dam and reservoir on a portion of the affected area. On page 114 of the Draft EIS, it is noted that the project would not meet present BLM visual resource management objectives for the area.

**25.7** See the revised Canoeing and Rafting sections under Recreation in Chapters 3 and 4 in this Final EIS.

**25.8** Canoeing would not be lost on a 90-mile stretch of the White River. See the revised Canoeing and Rafting section of Chapter 4 in this Final EIS.

**25.9** See the revised Recreation sections in Chapters 3 and 4 in this Final EIS.

**25.10** Tamarisk (*Tamarix chinensis*) is currently abundant along the White River. Construction of the proposed dam would, to some extent, give competitive advantage to this non-native phreatophyte over native riparian vegetation. The frequency and extent of flooding would be reduced, allowing the build-up of fuel which, with the occurrence of fire, would kill native cottonwoods and willows and favor the vigorously root-sprouting Tamarisk. Further, the reduced flooding of the riparian zone would

# Comment Letter 26

25.10 put cottonwood establishment at a disadvantage because of the flooding  
(cont.) required for germination of this species (see Vegetation, Anticipated Impacts section, pages 101 and 102 of the Draft EIS).

Some authors contend that, even without dams, it would be highly unlikely that cottonwood communities could maintain their dominance over tamarisk (Ohmart, Deason, and Burke, 1977).

25.11 See the revised Recreation sections in Chapters 3 and 4 in this Final EIS.

25.12 The views expressed will be considered in the decision-making process. See the revised Chapter 1, Purpose and Need section, for information concerning oil shale technology and water needs; Alternatives Not Discussed section in Chapter 2 for data regarding alternative dam sites; and the Groundwater section of Chapter 3 for additional information on groundwater.

25.13 The Utah Geological and Mineral Survey has coordinated information concerning geologic site suitability from various sources and a summary of findings appears as follows (Ritzma, 1981):

This morning (10-30-80) I met with Mr. Rees Madsen, White River Shale Project (WRSP); Lowell B. Page, mining engineer, Cordero Mining Company; B. C. Cummings, Senior Project Engineer, Mine Development, Phillips Petroleum (WRSP); and C. E. Doney, Project Manager, Phillips (WRSP), in the office of Senior and Senior, Salt Lake City.

We agreed that the integrity of the White River Dam site - anchoring it in jointed Uinta formation - as a matter of concern but that it is certainly one that can be met and remedied if the difficulties are recognized in advance and necessary action taken in design and construction. There was general agreement that this is being done at present and will continue to be done.

See also Oral Testimony Response 34 and Letter Response 27.37. For information about leaching, see Letter Responses 40.5, 64.12, and 67.5. Also, a study completed by Bingham Engineering (1981b) concludes that, "No geologic conditions have been discovered that might preclude the construction of a safe embankment dam and related structures with proper design provisions and adequate construction control."

MURRAY POPE  
BOX 475  
SNOWMASS CO 81654

western union

Mailgram



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3039273551 MGM TDMT SNOWMASS CO 59 02 08 0149P EST

DISTRICT MANAGER VERNAL DISTRICT OFFICE  
BUREAU OF LAND MANAGEMENT  
170 SOUTH 500 EAST  
VERNAL UT 84078

26.1 URGE YOU TO ADOPT ALTERNATIVE NUMBER 2 FOR WHITE RIVER DAM EIS DAM  
SHOULD NOT BE CONSIDERED UNTIL WATER AGREEMENT REACHED WITH COLORADO  
PLEASE ALSO ENSURE THAT ENDANGERED SPECIES ACT IS UPHOLD IN THIS AREA  
MURRAY POPE CHAIRMAN ROARING FORK GROUP SIERRA CLUB

1351 EST

MGMCHMP MGM

## Response Letter 26

- 26.1 The views expressed will be considered in the decision-making process.

## Comment Letter 27



### United States Department of the Interior

GEOLOGICAL SURVEY  
RESTON, VA. 22092

FEB 5 1991

#### Memorandum

To: District Manager, Bureau of Land Management  
Vernal, Utah

Through: Assistant Secretary--Energy and Minerals

From: Director, Geological Survey

Subject: Review of draft environmental statement for White River  
Dam Project, Uintah County, Utah

We have reviewed the draft statement as requested in your letter.

- 27.1 Our principal concern is that the proposed reservoir would interfere with the recovery of valuable resources of oil shale and gilsonite. We believe that further consideration should be given to an alternative site that would lessen the impact on these resources.

Our concerns are discussed in detail in the enclosure.

*William H. Allen*  
Director

Enclosure

## GENERAL COMMENTS

Mineral resources. It is important that the potential impact of the proposed project on future recovery of oil shale and gilsonite be adequately assessed.

- 27.2 The richer deposits of oil shale are contained within the Parachuta Creek member of the Green River Formation and are located under the White River channel over the western two-thirds of the proposed water impoundment area. The Mahogany zone of the Parachuta member which contains the richest oil shale and the most likely to be mined, crops out in the White River channel in the east side of sec. 7, T. 10 S., R. 24 E., S.M. The Mahogany zone outcrop can be traced above the high-water mark of the proposed impoundment in Bell's Hole Canyon except for a few acres on the west and near the dam. Tracts U-a and U-b are designed to essentially miss the White River channel as initial prototype oil shale lease areas, and it is believed the oil shale extends beyond these bounds to include the adjacent White River area slated for the dam and water impoundment.
- 27.3 Current mapping of the gilsonite veins fails to extend them into the White River channel. However, it is a common assumption that the Wagonbound and Weaver veins are one and the same and, therefore, probably exist through the White River channel. There could be other veins that exist in the channel and would be affected by an impoundment of water as proposed in the draft. Several veins exist in the path of the proposed pipelines carrying water from the impoundment to the power plant.
- 27.4 Mining. The proposed reservoir may make it more difficult to develop oil shale tracts U-a and U-b based on the present knowledge of the geology of the area; however, the degree of effects are imperfectly known. The "Guidelines for Mining Under Surface Water, Phase II (Final Report)" prepared in May 1976 for the U.S. Bureau of Mines (National Technical Information Service PB 264 729) should be referenced in the EIS.
- There appear to be two potential effects of the reservoir on the mining of tracts U-a and U-b:
- 1) The shafts and perhaps the mine would probably be wetter because of the increased buildup of hydraulic head in the Uinta and Green River Formations (especially the Birds Nest zone). It is difficult to determine whether mining would be infeasible.
  - 2) Long-term subsidence caused by mining will result in a stress field in the overlying rocks that will be propagated upward and outward from the edge of the Ua/Ub mining area. This will tend to cause new fractures to open and old fractures to reopen. This area would possibly underlie the reservoir along 3 to 5 miles of the northern boundary and thus increase the downward leakage of water.

Few data are available on the nature of joints at depth in this area. At most outcrops, joints in the upper part of the Green River Formation appear to be tight and thus not very permeable. Two inclined cores on tracts U-a and

27.4  
(cont.)

U-b indicated that steeply dipping joints and fractures at depth are rare. Potential for water to seep into the joints of the Uinta Formation, and thence downward into the Green River Formation, cannot be quantified with present data.

Hydrologic testing would need to be done to quantify the problem of seepage loss from the reservoir. Sedimentation within the reservoir may also reduce possible seepage loss.

## 27.5

Alternative site. We disagree with the decision to not evaluate an alternative damsite on the White River. The Watson site was eliminated "because it would back water into Colorado," a political rather than environmental consideration. There are currently discussions regarding a White River compact that potentially could resolve this interstate issue. The Fleming Gorge reservoir (Green River) and Lake Powell (Colorado River) both cross Utah state lines. The Watson site may offer some environmental advantages and should be considered in the EIS. The most significant environmental advantage to a dam and reservoir site further upstream would be to reduce the potential effects on oil shale resources and underground oil shale mining.

## 27.6

Streamgaging. The U.S. Geological Survey operates a streamgaging station (elevation 4,946.78 feet above mean sea level) on the White River about 6 miles upstream from the proposed dam. Since the gage would be inundated when the reservoir is operational, we recommend that provision should be made to relocate the gage.

## SPECIFIC COMMENTS

## 27.7

Page 1. The second paragraph incorrectly lists White River Shale Corporation as one of the three companies in the White River Shale Project. The proper company is Sohio Shale Oil Company.

## 27.8

Page 2, Alternatives. What other sites were considered? What were the "State selection criteria" that resulted in selecting this site? The information in this section does not provide an adequate basis for review.

## 27.9

The alternatives section does not consider the conjunctive use of ground water with direct diversion of surface water. If ground water can be used for a part of the supply, pages 9-10 indicate that direct diversion from the river would satisfy the 97-CFS demand most of the time. Ground-water supplies for periods of low streamflow are available at Ua/Ub and probably at the TOSCO site. (These make up more than one-half of the 97-CFS constant demand).

## 27.10

Page 3, Alternative 1 - White River Dam and Reservoir. The implications of the first paragraph are significant and not adequately explained. The following points should be addressed in more detail:

1. The "life of the project," insofar as its potential effect on the underlying oil shale resource is concerned, will extend beyond its useful life as a reservoir. A saturated, silt-filled reservoir will have the same effect on recovery of the underlying shale as would a water-filled reservoir.

- 27.11 2. The oil shale resource beneath the 1,360-acre reservoir appears to be in excess of 200,000,000 bbl. Recognized guidelines for mining beneath bodies of surface water would greatly increase this number.
- 27.12 Page 5. Our previous comment applies to the second paragraph under "Purpose and Need of Proposed Project."
- 27.13 In the third paragraph, omit oil from White River oil Shale Project title.
- 27.14 Page 8. Was loss of water from the reservoir through evaporation calculated and considered in the EIS? The yearly loss of water through evaporation should be quite large.
- 27.15 Page 9. The estimated evaporation rate appears to be too small. The reservoir will be nearly full during the highest evaporation period.
- 27.16 Page 10. The 80,000-acre-foot ground-water storage at Ua/Ub is misleading as written. The 80,000 acre feet are estimated to underlie U-a and U-b only in the Birds Nest zone. This does not constrain the ability at Ua/Ub to pump more than this from this zone. There is good evidence that the underlying Douglas Creek aquifer contains large quantities of ground water, perhaps much more than the Birds Nest.
- 27.17 The statement in paragraph 6 as to "unsuitable for...use" is not supportable by the available data. Such water can be used for cooling, wetting spent shale, dust control, etc., all of which make up a large part of the projected demands for water by an oil shale-plant.
- 27.18 In the last paragraph, the reference to "loss of oil shale mining capability" also applies to the White River Reservoir (see our previous comments). Rough calculations using U.S. Bureau of Mines guidelines suggest that the reservoir, per se, would affect the recovery of perhaps 200,000,000 bbl. of shale oil in place as underlying shale. The recovery of an unknown but significant amount of shale would be affected along the north boundaries of Ua/Ub.
- 27.19 Pages 13, 192. The statement indicates that a cutoff will be constructed beneath the proposed dam. Effects of the cutoff on ground-water levels and utilization downstream from the impoundment should be addressed.
- 27.20 Page 40, Terrestrial Wildlife. The figure "147 beavers" implies an unwarranted precision. A range should be used. Also, the figure "200 deer" is more than was found during all of the baseline study when population was high.
- 27.21 Page 40, Birds. Why not improve habitat for osprey and bald eagles, and possibly pelicans, ducks, coots, and others?
- 27.22 Page 41, Birds. Why assume 36 Canada geese lost? The geese will nest on ponded water also.
- 27.23 Page 43, paragraph four. The 26,000 ac-ft/yr estimate is the high end of Ua/Ub estimates and is perhaps twice that of most other estimates of a similar-sized plant.

- 27.24 Page 47. This discussion of oil shale is superficial. There are adequate data and knowledge to expect that the oil shale resource beneath and adjacent to the reservoir will be much more difficult to recover with than without the reservoir. See the USBOM publications on mining beneath bodies of surface water.
- 27.25 The discussion of oil shale leases should indicate clearly that there are only two Federal leases. Other proposed developments are on State leases or private lands.
- 27.26 Page 51, Water. Note that the Bonanza diversion is via wells in the alluvium. This diversion has amounted to about 1,000 ac-ft/yr for several years.
- 27.27 Page 53, Water Quality, paragraph four. There are several years of sediment data on the White River at the Watson Gage, which is only a few miles upstream of the damsite.
- 27.28 Page 53, Hydrology, paragraph two. It is not certain that the Birds Nest Aquifer should be described as the "Principal aquifer within the project area." True, more is known about it than about the alluvium, the Uinta Formation, or the Douglas Creek Member; but, in terms of a potential water supply, the Birds Nest may or may not be "principal." In terms of use, the alluvium along the White River has been a source of water supply for Bonanza for many years. Both the Uinta Formation and the Douglas Creek member are probably more widespread than is the Birds Nest. Although little is known of their water-bearing characteristics, they appear to be a significant potential source of ground water.
- 27.29 Page 55, Water Quality. This discussion is somewhat misleading and incomplete. First, the scant data available indicates that ground water in the Douglas Creek member in this area is of better quality than described. (This probably is also true of water in the alluvium along the river.) Second, many of the potential uses of water by an oil shale industry do not require "good" quality water. As written, this short section leaves the reader with the impression that ground-water quality in this area is so bad that it can not be used.
- 27.30 The Birds Nest is in the upper part of the Green River Formation, not in the Wasatch Formation. (The Wasatch underlies the Green River Formation.)
- 27.31 Page 77. Rangely, Colorado, is introduced as possibly being affected. Yet the remainder of the EIS does not provide any discussion of effects on the Rangely area. It should be recognized that Vernal, Utah, is about 36 miles from the White River damsite; Rangely, Colorado, is only about 25 miles from the damsite.
- 27.32 Page 91, Minerals, paragraph one. The statement "The reservoir would not limit the mining of oil shale on all other parts of tracts U-a and U-b" (Phillips, 1930) cannot be supported by present knowledge of the effects of the reservoir. First, the statement implies that some "limits" would be

- 27.32 (cont.) placed on mining beneath the reservoir. This may be true; however, the greatest unknown is the hydrologic effect of subsidence along the north edge of tracts U-a and U-b. The draw area where near-vertical fractures would tend to open to some distance above the mine probably would extend beneath the reservoir even if mining stopped at the projected reservoir edge.
- 27.33 Page 95, Anticipated Impacts. The discussion in paragraph 1 should include the added evaporation losses (at least 7 cfs).
- 27.34 Page 100, paragraph seven. For review purposes, this discussion should include a graph showing the diminishing yield of the reservoir as sediment builds up.
- 27.35 Page 101, Ground Water. The first two paragraphs seem to contradict each other. In addition, two questions are apparent:
- 27.36 1. Bank storage (ground water) will occur as the reservoir fills and the Uinta Formation becomes saturated. What are the implications?
- 27.37 2. Recharge to the Uinta and to the Birds Nest aquifer will increase the potential for water problems when mining oil shale in the area. Can these problems be identified?
- 27.38 Page 102, second paragraph. The riparian vegetation would not be inundated many times. All you would have is exposed mud banks that would be good for turtles and shore birds.
- 27.39 Page 102, fourth paragraph. A mitigation to the nonflooding caused by the dam would be to allow a good flow or induced flooding downstream every few years.
- 27.40 Page 105, Mitigation, first paragraph. Why impractical? The EIS should explain the details of cost, benefits, and alternatives.
- 27.41 Page 107, seventh paragraph. Shore birds should be included along with migrant waterfowl and snipe.
- 27.42 Page 118, Minerals. The Mahogany Zone is the major oil shale unit in this area. How many acres of the Mahogany Zone would be covered by the Bell's Hole Reservoir?

27.1 For a discussion of oil shale, see Letter Response 70.1. Concerning gilsonite, see Letter Response 27.3. The nearest vein exposure to the proposed reservoir is the Little Emma vein, located approximately 0.3 mile from the river at Ignatio. The Wagon Hound vein apparently terminates approximately 0.6 mile from the upper end of the reservoir near Hell's Hole Canyon (Bingham Engineering, 1981a).

27.2 Thank you for your information explaining the locations of the richer deposits of oil shale in relation to the proposed White River Dam Project and alternative sites.

27.3 Mining of gilsonite could occur along project-related linear facilities. The most recent investigation of the relationship of gilsonite veins with the reservoir impoundment area and river channel concludes (Bingham Engineering, 1981a):

Specific field inspections have been made to locate inter-sections of the gilsonite veins with the reservoir basin and eroded river channel. Gilsonite veins were extended along mapped alignments to the canyon walls of the river channel. These locations were examined as well as upstream and downstream for vertically extensive open jointing and evidence of the gilsonite veins. No evidence of the veins was found at any of the locations. The observations of geologists and engineers at the American Gilsonite Company, as indicated above, is that the veins become very shallow and narrow as they approach the river and are essentially non-existent at the river.

The nearest surface exposure of a gilsonite vein to the proposed reservoir is the Little Emma vein, located approximately 0.3 mile from the river at Ignatio (see Figure 5). The Wagonhound vein apparently terminates approximately 0.6 mile from the upper end of the reservoir near Hell's Hole Canyon.

Therefore, gilsonite mining within the reservoir basin would probably not be affected.

27.4 A worst-case situation was used for analysis of impacts. In Oil Shale Tracts Ua and Ub, the worst case was that an estimated 81.5 million cubic yards would be inundated, resulting in a loss of more than 2 billion gallons of shale oil. However, as you point out, the effects of the reservoir on mining are not completely known. The Guidelines (USDI, Bureau of Mines, 1976) you refer to have been added to the list of References Cited in this Final EIS. Also, see Letter Responses 22.1, 22.3, and 27.37.

27.5 The selection criteria for the proposed dam site was not necessarily political. Economic and environmental factors were involved. For example, an alternative for backing water into Colorado was eliminated because of inundation of agricultural lands near Rangely. Please refer to Letter Response 25.2 for more discussion.

- 27.6** According to discussions with U.S. Geological Survey in Salt Lake City (1981), the stream gaging station at 4,946.78-foot elevation on the White River near Watson, Utah, has been removed. About 5 years ago (October 1976) another gage was established on the White River near the Colorado-Utah state line. This gage data correlated closely with the Watson gage data and, at the end of water year 1979, the Watson gage was removed in anticipation of the proposed White River Dam construction.
- 27.7** The Summary and the Purpose and Need section of Chapter 1 in this Final EIS have been revised to include this information.
- 27.8** See Letter Response 25.2 for information on this matter.
- 27.9** See Letter Responses 25.3 and 27.17.
- 27.10** See Letter Response 22.3.
- 27.11** The figure for reservoir inundation has been revised to 1,980 acres in this Final EIS. See the revised Impact section of Alternative 1, Minerals, in Chapter 4 of this Final EIS. Refer also to Letter Responses 22.3 and 27.4.
- 27.12** See the revised Chapter 1, Purpose and Need section, in this Final EIS.
- 27.13** Chapter 1, Purpose and Need section, in this Final EIS has been corrected as suggested.
- 27.14** Evaporation loss was considered. See the Draft EIS, page 9, and page 95 for evaporation data as it relates to the White River Dam and Reservoir. Also, see Letter Response 27.15.
- 27.15** The evaporation rate was calculated based on 1,980 surface acres and about 36 inches of evaporation per year as indicated for northeastern Utah. Mean annual lake evaporation data was supplied by the U.S. Department of Commerce, Environmental Science Service Administration (1968), and National Oceanic and Atmospheric Administration (1974). One thousand nine hundred and eighty surface acres with 36 inches of evaporation each year would amount to approximately 5,670 acre-feet should the reservoir be completely filled all year. This amount was reduced to 5,569 acre-feet as a reasonable evaporation budget.
- 27.16** See Letter Response 27.28 for further discussion of your concerns. We concur that there is evidence that groundwater may be used more in the future. However, because not enough site-specific information is available to make a reasonable judgment on the availability or quality of groundwater for energy development (i.e., oil shale processing), it was not considered for this proposal or alternatives.
- 27.17** The assumption used in the Draft EIS was that groundwater was unsuitable for domestic, commercial, or agricultural purposes. Studies by VIN Colorado, Inc. (1977) and the Upper Colorado River Basin Assessment Report to the U.S. Water Resources Council (Colorado Department of Natural Resources 1979) support this assumption. Additional studies may

- 27.17 (cont.)** provide information proving groundwater feasible to augment water from the White or Green Rivers. Groundwater might also be used to supply some of the smaller water consumers projected for the region. Also, see Letter Responses 27.28 and 27.29.
- 27.18** See the revised Impact section of Alternative 1, Minerals, in Chapter 4 of this Final EIS. See also Letter Responses 22.3 and 27.4.
- 27.19** It is the intent of dam cut-off trenches to stop, if possible, all flow under or around the dam. This is a safety feature. The groundwater in the alluvium is charged by river flow and, hopefully, would be interrupted at the dam site. Certainly, as flows are released below the dam, the alluvium would be recharged by river flows.
- 27.20** The numbers (176 beaver and 200 deer) are arrived at using baseline data studies and formulated estimates. They may indicate an unwarranted precision. However, it is difficult to analyze the impact of a range of numbers. Therefore, the number is used which is the end product of the formulation. It may be low or high, but is not an error that is statistically significant.
- 27.21** The FWS Technical Assistance Report (Appendix 10 in this Final EIS) indicates that there may be some improvement or at least wintering habitat benefits for bald eagles. The osprey use now and in the future is not expected to be significant. For mitigation measures proposed for waterfowl and other birds, see the Mitigation sections under Alternative 1, Wildlife section in Chapter 4, and Appendices 4 and 10 in this Final EIS.
- 27.22** Geese need particular habitat characteristics (riparian vegetation, slope, etc.) in addition to water. As the reservoir filled, most of these characteristics would be lost for many years.
- 27.23** Since publication of the Draft EIS, the 26,000 acre-feet per year figure has been changed. See the revised Chapter 1, Purpose and Need section, in this Final EIS.
- 27.24** Environmental impacts, such as the difficulties of oil shale recovery that would result from the dam construction and water impoundment, are not included in the EIS section on Affected Environment. This information is included in the revised Impact section of Alternative 1 under Minerals, Chapter 4 of this Final EIS. The US01, Bureau of Mines (1976) publication Guidelines for Mining Under Surface Water is included in the revised references. See also Letter Responses 22.3 and 27.4.
- 27.25** Page 47 of the Draft EIS under Oil Shale heading, specifies the two Federal oil shale leases: "The project area for the White River Dam lies adjacent to Federal Oil Shale Lease Tracts Ua and Ub...". Also specified are: "Other adjacent leases include Tosco Corporation's 14,000-acre (5,666 ha) lease on State land..."
- 27.26** On a worst-case basis, Bonanza, Utah could use 3,040 acre-feet per year with a water right of 4.2 cfs. That right is for White River water which is taken from wells along the river.

- 27.27 We concur with your comment. Data for the sedimentation determinations came from the USGS at Salt Lake City and Vernal, Utah. They provided measurements of daily flows at the Watson gaging station for the period 1931-1979; daily flows at Ouray 1975-1979; suspended sediment concentrations at the Watson gage April to July 1976; suspended sediment concentrations of record 1975 to 1978; and raw sediment concentrations data at Ouray April to August 1979.
- 27.28 The Bird's Nest Aquifer is referred to as the principal aquifer because, during the environmental baseline oil shale drilling program, this aquifer was tested and monitored intensively from 1974 through 1976. Monitoring has continued on a less intensive basis since that time. Other aquifers have not been studied. As you point out, the Douglas Creek Member occurs extensively throughout the area. However, based upon the results of a series of aquifer tests conducted in the region by the USGS, the Douglas Creek member was found to have a maximum transmissivity of about 1,500 gpd/foot. To generate water from this source to support mining activities would require a large number of wells (20 to 30) scattered over several thousand acres (Phillips 1980). Little is known of the Uinta formation's water-bearing characteristics so it was not considered reliable for this EIS.
- 27.29 The "worst-case" analysis was used to make the projections. In addition, those investigating groundwater quality have indicated that not enough data is available to make reasonable predictions on availability of the groundwater resource for industrial use. Data used came from the Upper Colorado River Basin Assessment Report developed by the Colorado Department of Natural Resources (1979), with the possible exceptions of the water in the alluvium along the river and the Douglas Creek member, the quality of groundwater is questionable and considerable treatment would be required prior to industrial application.
- 27.30 Your comment is correct. The text has been changed; see Figure 3-1 in this Final EIS.
- 27.31 The EIS states that Rangely might be slightly affected. This was intended to convey to the reader that the impacts were too small to project with any degree of accuracy.  
The reasons for the slight impact are: (1) Distance from the dam site to Rangely would be only 25 miles as the crow flies, but acceptable all-weather roads between them are much longer; and (2) Vernal is considerably larger than Rangely and serves as a regional shopping and service center, which would attract a larger portion of the impact population.
- 27.32 The text has been revised to reflect this information. See the Minerals section of Chapter 4 in this Final EIS.
- 27.33 The discussion in paragraph 1 on page 95 of the Draft EIS under the Anticipated Impacts section does include evaporation loss anticipated from the proposed reservoir. In fact, 7.6 cfs (5,500 acre-feet) was used as the calculated estimate.

- 27.34 For the purpose of this EIS, sediment build-up was analyzed in the short-term (project life) and the long term (after the project life) under a "worst-case" situation. Therefore, it was decided that a graph would not substantially add to the analysis.
- 27.355 Your observations are correct. The first paragraph under the heading of Groundwater on page 101 of the Draft EIS has been deleted. The second paragraph remains in the text. The baseline data suggests that, as a result of increasing the head, aquifer discharge in the reservoir area would be reversed and inflow from the river would occur. This would also result in an increased aquifer discharge into Evacuation Creek. Based on USGS digital model studies, it has been predicted that, as a result of filling the reservoir, about 0.9 cfs of White River water would flow into the Bird's Nest Aquifer (Phillips, 1980). The Mahogany zone has been historically dry, and it is unlikely that the few feet of surcharge expected to occur at this location would alter that condition (Phillips, 1980).
- 27.36 Bank storage occurs at all reservoir sites. The chemistry of the rocks in the proposed reservoir area has been tested (Bingham Engineering, 1981b) and was found to be competent (i.e., will not disintegrate when exposed to water). This is especially true of the Uinta formation which would form the bulk of rock in contact with the stored water.
- 27.37 According to Phillips (1980) and USGS (1981), the groundwater may or may not follow bedding planes. Few data are presently available on the nature of joints in the area. However, Bingham Engineering concluded in their studies that outcrops and joints in the Uinta formation appear to be tight and thus not very permeable. The joints tend to close with depth with a resulting decrease in permeability. Bingham Engineering's hydrologic testing was done to better understand the problem of seepage loss from the reservoir. They concluded that sedimentation build-up would reduce any possible seepage loss into the Bird's Nest Aquifer (Bingham Engineering 1981a and 1981b). Additional recharge of the Bird's Nest Aquifer should not present significant dewatering problems for oil shale mining. Sedimentation within the reservoir could well reduce any possible seepage loss. Also, refer to Appendix 12 in this Final EIS.
- 27.38 The water levels of most reservoirs in Utah fluctuate because of differences in annual precipitation. It is recognized that the exposed mudflats would have some beneficial effects to some species of shore birds; however, turtles have not been observed in the project area.
- 27.39 This mitigation could be done with little interference to the proposed project's purpose. It has been recommended by the FWS in their official Biological Opinion that cottonwood stands below the dam be maintained.
- 27.40 Reestablishing riparian vegetation is impractical because of differences in terrain slope and soil depth. The present riparian vegetation occurs on level ground with deep soils (both necessary to support growth). Inundation by a reservoir would leave primarily steep slopes and shallow soils, which would not support extensive riparian growth. For more information, see page 8 of the FWS Technical Assistance Report in this document (Appendix 10).

## Comment Letter 28

27.41 Shorebirds are not considered to be game birds, as are migrant waterfowl and snipe.

27.42 The Hell's Hole Reservoir would occupy approximately 260 surface acres. The reservoir would probably not seriously affect the oil shale zone. It would not overlay Oil Shale Tracts Ua or Ub.

February 7, 1981

Dear Manager,

28.1

Regarding the Draft Environmental Statement for the White River dam project, I suggest Alternative 2, the no action alternative. As I do not believe oil shale development will receive the Federal subsidies needed to start these projects (in light of the policies of the new administration), there will not be a need for the White River dam.

Sincerely, *Stephen D. Flint*  
Stephen D. Flint  
45N-400W, Logan UT

## Response Letter 28

- 28.1 The views expressed will be considered in the decision-making process. See the revised Chapter 1, Purpose and Need section, of this Final EIS.

## Comment Letter 29

FOUR CORNERS WILDERNESS WORKSHOP  
715 West Apache  
Farmington, New Mexico 87401

February 5, 1981

District Manager  
Vernal District, Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Dear Sir:

### 29.1

The draft Environmental Impact Statement on the White River Dam Project lists as Alternative one, the actual construction of the dam. This would have serious consequences on wildlife habitat and destroy a beautiful riparian area. Our group is particularly concerned with the dwindling but very important wetland resources in our section of the country. We call your attention to Executive Order #11990, Protection of Wetlands, which directs Federal agencies to provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.

Although this is a draft EIS and formal comment on alternatives may be premature we request that Alternative 2, no action, be selected. This would delay the project until complete environmental impacts could be studied. We ask that at least an alternative which would not destroy the riparian wetlands be selected.

Sincerely yours,

*Donovan H. Lyngholm*

Donovan H. Lyngholm  
Box 103  
Flagstaff, AZ 86002

## Response Letter 29

- 29.1 The views expressed will be considered in the decision-making process. Executive Order 11990 is noted on page 101 of the Draft EIS. The FWS Biological Opinion, Appendix 4 in this Final EIS, contains new information based on additional environmental studies. In addition, a Wildlife and Riparian Vegetation Mitigation Plan would be prepared by the Utah Division of Water Resources, FWS, UWR, and BLM to satisfy the requirements of the Biological Opinion prior to construction of the White River Dam and Reservoir. This mitigation would offset the loss of riparian habitat which would occur with construction of the White River Dam.

## Comment Letter 30

Box 451 Rt. 1  
Pocoma, CO 81428  
Feb. 4, 1981

District Manager, Vernal District Office  
Bureau of Land Management, 170 S. 500 E.  
Vernal, Utah 84078

Dear Sir:

30.1

I am writing in support of alternative #2 in the EIS on Utah's proposed White River Dam. I believe that action on this dam is premature at this time, since studies on who owns what shares of surface and groundwater are incomplete. In addition, the total water requirements for the new technologies which would propose to use the stored water has not been determined.

As a farmer dependent on adequate agricultural water, I urge you to take no action on the dam at this time.

Sincerely,  
Susan Braker

## Response Letter 30

- 30.1 The views expressed will be considered in the decision-making process. See the revised Chapter 1, Purpose and Need section, and the Groundwater section of Chapter 3 for information regarding your concerns.

## Comment Letter 31



SOHIO SHALE OIL COMPANY

50 SOUTH MAIN STREET, SUITE 930  
SALT LAKE CITY, UTAH 84144  
TELEPHONE (801) 328-3700

February 4, 1981

Mr. Lloyd Ferguson  
District Manager  
Bureau of Land Management  
170 South Fifth East  
Vernal, UT 84078

Dear Mr. Ferguson:

- 31.1 Upon review of the draft environmental impact statement for the White River Dam Project we noticed that inadequate attention was given to the necessity of the dam. Although the White River Dam Project EIS states that the dam would inundate several acres of "potentially recoverable oil shale deposits" (p. 91), the EIS does not stress that substantially more acres of potentially recoverable oil shale deposits may not be developed if the White River Dam is not built.
- 31.2 Although other alternatives to the White River Dam may exist, (at least for the early producers of oil shale), the White River Dam is the only long-term practical source of water. Furthermore, the White River Dam is the only alternative which produces net energy. This point needs to be emphasized in the EIS since the United States is energy short.
- 31.3 Also, the comparative costs between the White River Dam and the other alternatives need to be explored further. Although the difference in costs may appear relatively small on a per barrel basis compared with the price of a barrel of oil, the pertinent comparison is between the cost differential of the alternatives and the profit margin. Even a seemingly small cost per barrel increase could impact the economic feasibility of the oil shale operations.
- 31.4 Another disturbing inference made in the draft EIS is equating loss of habitat with the death of the animals (p. 105). The more mobile animals will surely migrate to another area that can support them. And, with the increased availability of water it would seem that the area may be able to support more animals, not less.
- 31.5 For your future information, a minor correction also needs to be made on the Statement on the White River Shale Project on page 1. The three companies involved in the project are Phillips Petroleum Company, Sunoco Energy Development Company, and Sohio Shale Oil Company.

We appreciate the opportunity to make these comments on the White River Dam draft EIS and hope that you will give them serious consideration in your decision.

Sincerely,

*Robert L. Dudiak*

Robert L. Dudiak, Manager  
Program Services/Community Development

nwl

31.1 Information on page 91 of the Draft EIS refers only to environmental consequences and not the purpose and need for the project. Page 5 of the Draft EIS, Purpose and Need section, lists known water requirements for specific energy projects. Page 7 stresses the essential need of water for accelerated regional energy development. See the revised Chapter 1, Purpose and Need section, in this Final EIS for the updated water requirements for energy development.

31.2 The views expressed will be considered in the decision-making process. Table 2-1, page 42, and Appendix 4, page 165, of the Draft EIS (Appendix 6 in this Final EIS) note that the White River Dam is an energy producer.

31.3 The cost figures presented in the Draft EIS were intended to give "a rough order-of-magnitude cost to be used for general comparative purposes only" (page 43 of the Draft EIS). Detailed estimation of these figures and analysis of resultant profit margins are beyond the scope of the EIS process.

31.4 The key to what you say is "...that can support them". The limited riparian habitat is almost like an island in an ocean. If that island were suddenly or slowly covered with water, its inhabitants would have no place else to migrate. Even the animals that fly would find any adjacent islands already occupied to their carrying capacity. An increase in water does not necessarily mean increased living area for wildlife. Other factors such as cover, food, edge effect (vegetation transition zone), etc., are more important than just increased amounts of water.

31.5 Thank you for the correction. This information is included in the Summary and the Purpose and Need section in Chapter 1 of this Final EIS.

## Comment Letter 32

Feb. 5, 1981

Lloyd Ferguson  
District Manager  
Vernal District TLM  
170 South 300 East  
Vernal, Utah 84078

Dear Mr. Ferguson:

I am commenting on the White River DEIS. The BLM is to be commended for doing the work it did on the study.

32.1

Several issues exist which would necessitate a complete or comprehensive EIS on the White River. Some of them are as follows:

- 1- Lack of adequate planning on the part of the State of Utah.
- 2- Lack of coordination with the Ute Indian Tribe.
- 3- The lack of adequate agreements with Colorado.
- 4- Potential energy developments other than oil shale that could compete for White River water such as the Moon Lake Power Project.

Along with the planning that exist, the loss of recreation and wildlife habitat would be great.

I support alternative #2, No Action, until a comprehensive EIS can come out on the White River for both Utah and Colorado in conjunction with integrated planning with the two states on oil shale development.

Sincerely,

*Harry Kachafian*  
Harry Kachafian  
195 South 300 West  
Logan, Utah 84321

## Response Letter 32

32.1

The decision-maker will consider your points of view concerning the proposed White River Dam Project. Interrelated projects and their potential sources of water have been discussed, to some extent, in both the White River Dam Project EIS and Moon Lake Power Plant Project EIS, Units 1-2.

It should be pointed out that the State of Utah solicited coordination with the Ute Indian Tribe. In a letter dated April 9, 1979 from the Ute Indian Tribe, the following statement was made: "...The Tribe is in favor of this dam being built, there doesn't seem to be a great impact on the environment caused by this construction in comparison to benefits received; i.e., flood control, power source, better utilization of available water and possible recreational uses."

Also, see letter Responses 15.4, 15.9, and 18.1; the revised Chapter 1, Purpose and Need section; and the Wildlife and Recreation sections of Chapter 4 in this Final EIS.

Presently BLM is preparing a comprehensive Draft EIS on oil shale and tar sand development in the Uinta Basin of Utah; and Colorado BLM is conducting environmental assessment work in the Piceance Basin of Colorado.

## Comment Letter 33

District Manager  
Bureau of Land Management  
170 South Fifth East  
Vernal, Utah 84078

Sir:

- 33.1 Enclosed is a report, "The White River Project, A case history of poor state planning". We ask that you include this report with the Final Environmental Impact Statement on the White River Project.

This report deals very much with state planning. Although Final EIS seldom have such material, we think that commentary on state planning is very important on the White River Project. If incorrect assumptions are made in the early planning, then the entire project may be faulted.

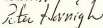
Likewise some research opportunities are discussed. Research opportunities are seldom discussed in EIS. Yet it is much easier to study living common birds than endangered species. It is much easier to study endangered species than fossils. When a narrow ribbon in a wide expanse is destroyed, all opportunity for biological investigations is also destroyed.

There is some commentary on canoe recreation. One only needs to see the streams in the Midwest or in Canada to realize how important canoe recreation is in many other states. It is important that Utah does not foreclose on any opportunity at too early of a date.

- 33.2 Some statements have been underlined. These particular statements or questions should be commented on by the BLM or some other agency. They may be deficiencies in the EIS.

Thank you for providing us with a very good draft environmental impact statement.

Sincerely,



Peter Hovingh

White River Committee

Utah Water Resources Council  
P.O. Box 1731  
Salt Lake City  
Utah 84110

February 1, 1981

### THE WHITE RIVER PROJECT A Case History of Poor State Planning <sup>1/</sup>

prepared by

Peter Hovingh

for the

White River Committee

of the

Utah Water Resources Council

The Utah Board of Water Resources met on December 21, 1977 to discuss the funding of larger water projects in Utah. After opening the meeting with a prayer, asking the Almighty for guidance, the Board proceeded with the meeting. Many projects were discussed and were proposed for legislation. During the session, the Virgin River was considered. The Water Resource personnel placed a bumper sticker on the plans which said, "TO HELL WITH THE WOUNDPIN MINNOW". It became apparent that Water Resource planning did not include fish, and that whereas the Almighty might guide the Utah Board of Water Resources and the Utah Division of Water Resources, the Almighty was not to protect any fish. It also seemed that the Division of Water Resources had the power to condemn fish to Hell.

The State legislature considered the financing of the water projects in January 1978. The State would sell bonds to finance this project. The entire concept passes with only one legislator in the Committee of Natural Resources of the House of Representative questioning the project. Rep. Atwood was concern with dam safety, an area that was not covered in the Draft Environmental Impact Statement. No environmental or economic concerns or alternatives were discussed and no one seem to ask whether or not these projects were needed. Utah Power and light mentioned the hydroelectric project was costly. The entire matter was discussed within a half hour. There was some opposition in the full legislature with a few legislators actually voting against this bonding legislation. The State would fund the project

<sup>1/</sup> Submitted to the Bureau of Land Management for inclusion in the Environmental Impact Statement on the White River Dam Project.

for \$10,000,000 and the Utes would provide \$10,000,000. The White River Project was born.

Bingham Engineering seem to do all the consulting work. Mr Bingham was Division head of the Division of Water Resources until 1967. Consultation and contracts on the White River Project apparently have not been subject to the rigorous State bidding process. This is as much as Mr Bingham's project as the State's project.

#### THE STATE PLAN

The earliest State Plan on the White River Project was published in March 1977 ("White River Dam and Reservoir for Irrigation of Indian Lands and Oil Shale Development"). Since this document was the first to describe the project, many assertions in this document will be analyzed below.

"At present there is no factual basis for assuming there are any threatened or endangered fish species in the White River in Utah or any of its environs." Page 7.

This statement was made before any aspects of the life history of the native fishes in the Colorado drainage was known. When the State received documents showing that endangered fishes may be in the White River, the state responded ("Proposed White River Dam Project, Public Hearing Transcript and Written Comments, June 9, 1977"):

"However, should surveys have missed some threatened and/or endangered species, we do not feel the very limited numbers that could possibly be present would be instrumental in future existence or nonexistence of threatened and/or endangered species. Consequently DWR does not consider the White River in Utah as critical habitat for threatened and/or endangered species." Page LVIII.

No further information on the life history of the native Colorado River fishes was available. Somehow these endorsements of the project were extracted from administrators of biologists and not from the professional biologists themselves.

It is often asserted that the squawfish is a trash fish and that even the Fisheries personnel poisoned the waters to remove the squawfish before Flaming Gorge was filled. Flaming Gorge was constructed before the National Environmental Policy Act and before the Endangered Species Act. New awareness of biological (and human) values exists now. White Man eliminated a lot of native animals in

settlement of North America. Native Americans were not treated much different than the environment in which they lived. Times are different now and we are still recovering from our past history.

An alternative fisheries program would incorporate the squawfish as a sport, catch and release fish. The squawfish readily takes to artificial lures. One would have to come to Utah to fish the squawfish, much as sportsmen travel to the Northwest Territories and to Louisiana to fish the large native fishes. It is unfortunate that the State attitudes which govern endangered native fishes tend to include all wildlife. Wildlife is not to be considered a resource when energy and water projects are being planned.

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"Climate, topography, distance, high turbidity and common arid terrain have effectively tended to keep the river isolated and out of the category of scenic wilderness rivers." Page 7.

"that the proposed reservoir offers excellent boating opportunities, as well as natural amenities for interpretive purposes and broad recreation usage". (Letter from the Division of Parks and Recreation in the "White River Dam Project, Proposed Action Plan, August 1979")

It is obvious that a dual recreation standard exist in State planning. Rivers do not have any recreation potential whereas reservoirs on the same rivers have excellent recreation potential. The White River has been proposed for study for scenic and wild river classification. Such proposals have met opposition, perhaps due to the oil shale values in the region or because Mr Watt (now Secretary of the Interior, involved with Mountain States Legal Foundation, and then involved as Director of the Bureau of Outdoor Recreation) and Gov. Rampton (involved with Mountain States Legal Foundation, with Energy Companies, and then as governor) killed the proposal in the early stages. Even now on the most recent proposal for studying scenic and wild rivers, only the lower portion of the White River was included in the proposed list for study. This is where the river flows through the flat country. The wild portion of the riparian habitat is not included.

It is realized that oil shale development could provide extensive profits for Utah. Scenic and Wild River classification could hinder oil shale development (but not prevent it). Instead of thwarting the protection of the White River, Utah should be protecting the riparian habitat. The State actually proposes to borrow \$18,000,000 to destroy the river and the wildlife.

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"For example, after the dam is built there will be more border vegetation along the edge of the reservoir than previously existed along the banks of the river." Page 8.

The banks of the reservoir will be the present greasewood/sagebrush vegetation where there is soil. Elsewhere it may be too steep for any vegetation. When the reservoir is drawn down, there will not be any vegetation. The reservoir actually will replace groves of cottonwood, willows, and hackberry.

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"The Ute Indian Tribe has a vested interest in the White River and will share in the financing of the project". Page 4.

"One area of concern, Mr Austin said, is negotiation with the Indian tribe. The tribe has indicated it will not discuss the project until the tribal water rights claims have been resolved. "Perhaps we could approach the tribe again, or get them active in participating in the project; but as of yet we have had very little conversation with the tribe along the lines that the tribe is participating with us in the preparation of the EIS and preparation of some of the engineering activities that are going on," Mr Austin stated." (Minutes of the Water Resource Board meeting on 15 Nov 1979, page 11).

All along in the planning of the White River Project (except in the Draft Environmental Impact Statement prepared for the BLM), there are many implications that the Utes are involved in this project and that a portion of the water will belong to the Utes. It is also noticed that there is very little communication with the Utes and that the State is proceeding ahead without involving the Utes. It seems that the Utes and the State should be in full agreement before any project is started. The State should tell the Utes that 200 deer will be killed or that the sustain yield of 68 fawns a year would be lost. The Utes should be told by the State that 176 beaver (and their yearly sustain yield) will be killed as well as numerous other mammals and birds. The State should tell the Utes that there may be no recreational benefits and there may be no wildlife benefits. The State should tell the Utes that the entire river will change. In short, the State should be forthright up front with the Utes. In short, the State should be equally forthright up front with the Whites as well as with the legislators.

Summary of the State Plan. It is apparent that the State Agencies will make many unsubstantiated claims to build a case for a unnecessary project. Indian irrigation was the first claim, although the State does not communicate with the Indians. Hydroelectric power is the second claim, although the State does not communicate with Federal Energy and Regulatory Commission. Water for Oil shale is the third reason for the project, although it is ironic that the State is willing to borrow money to provide aid to oil companies. These last two considerations, together with wildlife and recreation will be discussed below.

#### ENVIRONMENTAL CONCERNS

I

##### Can the White River Project Survive Without Any Water Users?

Some state officials have said that the White River Project should stand on its own merits. This is not an oil shale project but a water project. Hydroelectric power is the merit of the White River Project. The proposed dam and generator system will generate 5 to 8 megawatts of electricity or 29,000 megawatt hours a year. Utah Power and Light together with the Intermountain Power Project will generate over 5400 megawatts. The White River Project is insignificant for producing electricity.

In places where water is abundant, hydroelectric power could make sense, although much environmental damage is always done (as the destruction of the salmon fisheries on the Columbia River). The active storage of the White River Reservoir is 70,000 acre feet of water. The White River requires 8750 acre feet of water to generate one megawatt. The evaporation (5500 acre feet) is an energy loss and requires 687 acre feet per megawatt. Intermountain Power Project would require only 17 acre feet per megawatt. If water is valued at 100 dollars per acre foot, the value of the energy loss (evaporation) is \$550,000 each year. Since 29,000,000 kilowatt hours is being generated, the cost of the energy loss is 1.7 cents per kilowatt hour. Utah Power and Light energy cost for burning coal is about 1.0 cent per kilowatt hour. Hydroelectric power does consume energy, and in arid regions is the most wasteful use of water.

The cost of the energy capacity for hydroelectric power is high. The White River Project value is \$2250 per kilowatt. Utah Power and Light last unit (Hunter) cost is about \$1000 per kilowatt. If the hydroelectric did not consume energy, then one can rationalize the high initial capacity costs. The value of waste water due to evaporation must be included in the energy consumption of the hydroelectric power in arid regions. The value of water in arid lands will probably increase faster than the value of coal, especially with all the recent water speculations in the energy rich regions of the arid west.

- 33.3 It is not known from the Environmental Impact Statement if the cost for the White River Project includes the generation equipment. If the cost does not include the generation system, the above capacity costs will even be higher. If the cost does not include the generation system, then the hydroelectric portion of the cost become meaningless and the economic benefits from hydroelectric generation must be reevaluated. Is the State purposely trying to avoid the rules and regulations of the Federal Energy Regulatory Commission by building the dam first and then applying for a permit to install the generating capacity?

Presently there is a large variation in the capacity cost per acre foot in Utah. The White River Reservoir cost is \$257 per acre foot of active capacity. A recent transaction for the Intermountain Power Project was \$1700 per acre foot. The renegotiated contract for the Municipal and Industrial water of the Bonneville Unit of the Central Utah Project ranges from \$3700 per acre foot to the inflated value of \$7500 per acre foot. The oil shale companies are getting very inexpensive water. In considering the end use of the water, the cost of the White River Project water would be 2.3 cents per barrel of oil and the MOST costly alternative would be 8.4 cents per barrel of oil. With the State of Utah assuming the entire risk of water development and the paying of the bonds, the State is subsidizing the oil shale developers while the most costly water projects serves the people along the Wasatch Front who have been living in Utah for many years. IS THIS STATE WATER POLICY?

There has been some discussion that hydroelectric power is pollution free. If the water in the reservoir goes to a coal-burning power plant and to oil shale development, one can not necessarily say that this hydroelectric power is pollution free.

The high siltation rate (1200 acre feet of sediment accumulated per year) is another aspect of the reservoir that makes the project a poorly planned project.

- 33.4 Some mention has been made that if upstream reservoirs are built, the siltation rate will be reduced. Probably an axiom could be that if no water entered the reservoir, the rate of siltation could approach zero. There is no mention of the source of the sediment in the OEIS. Perhaps all the sediment would enter the White River below all the Upstream developments. Although the OEIS could not cover the oil shale development, it is routinely seen that when a large development comes to an arid region, there is often an increase in sediment in the streams due to off-road vehicle use and to the mining operations. This increase sediment may off-set the confinement of the sediment by the upstream developments. Perhaps more seriously one should ask just what are the management plans for the reservoir will the reservoir is silted in beyond function. IS THE STATE LEAVING FUTURE GENERATIONS AND TAXPAYERS A HUGE PROBLEM?

Can the White River Project stand alone without any water users? In view of the high cost of the hydroelectric capacity, the large cost of the water evaporation in an arid region, the high siltation rate of the reservoir, and the destruction of renewable resources as wildlife, the answer to the question is NO, unless the State Water Policy is to waste water in an arid environment- just to keep Californians from using the water for downstream agriculture.

## II

### Who are the Water Users and How Much and When Do They Need this Water?

The users of the reservoir waters and the White River include: White River Shale Project (26,000 af), Tosco (18,000 af), Moon Lake (18,000 af) and evaporation (5500 af). Moon Lake Power Plant Project Units 1 and 2 seems to prefer pulling water directly from the Green River (OEIS). At the hearing on 7 January 1981 in Salt Lake City, two additional oil shale developers were asking for water (18,000 ? af x 2). Parasho oil shale company is asking for water (18,000 ? af). This amounts to 121,000 acre feet of water for commercial development of energy. The Utes are allocated 27,000 acre feet and may have first rights over the water (Could the Utes ask for 27,000 acre feet to preserve the riparian habitat on the entire White River?). Both Tosco and the Utes (for agriculture) would require additional downstream diversion dams that could hinder and destroy additional recreation and wildlife habitat. Utahn use of the White River now adds up to 148,000 acre feet. Colorado is allowed 78,000 acre feet for oil shale development

from the White River although there may be as many as 39 applications for the entire White River. The total requirements of water come to 226,000 acre feet from a river whose average yearly flow is 503,000 acre feet. The consumption averages out to 18,000 acre feet per month and the average flow per month is more than 20,000 acre feet. The reservoir is only needed for the years with low water. With no reservoir the needs of the developers would be available during the average year. The riparian life could even maintain itself and the big runoff in May and June would still occur- preserving the islands in the White River. If half of the energy developers' water requirements came from Flaming Gorge Reservoir, the river would have some vitality (it would be a river and not a creek).

- 33.5 The DEIS alternatives consider only full scale commercial development. Oil shale development is only at the experimental stage at this time with water requirements largely unknown. Use of the White River water for pilot programs and use of Flaming Gorge reservoir for commercial use is another alternative. Tosco has stated that its initial pilot mining needs only 10 gal/min (which can be hauled by truck), a single Tosco plant needs 1000 gal/min and a commercial facility needs 11,200 gal/min (from "White River Dam Project Proposed Action Plan, August 1979").
- 33.6 The cost from the Green River alternative (8.4 cents per barrel of oil) is only slightly above the cost of water from the reservoir (2.3 cents per barrel of oil). Does the cost of water from the reservoir include the costs to operate the pumps and the pipelines? It seems that the cost of the pumps in part of the cost of the Green River alternatives, but the White River reservoir would also have to have its water pumped. Could water be utilized directly from Flaming Gorge for 25 cents on a barrel of oil? The energy companies have great experience in building pipelines (across continents and mountains and tundra).
- 33.7 Because the oil shale development needs of water is not known or the time which the development will occur and since the reservoir is an unilateral action whose usefulness will rapidly diminish with the high rate of siltation, it certainly seems that construction of the reservoir at this time is a waste of water resources. The oil shale developers should show a plan of development in the Final EIS instead of just supporting the dam and reservoir without commitments to development. The State should also insist on only those developments that are the most water efficient and the least consumptive of water.

## Measuring the Wildlife Losses

- 33.8 The DEIS for the White River for the first time since the project has been proposed in 1965, begins to evaluate the effect of the project on the riparian habitat, wildlife and recreation. The only large deficiency was a herpetological study (in particular, are there any snake dens within the impacted area?). Perhaps the deficiency stands out because so good was the report on the mammals, birds, and fish. It would be useful to list the twelve species of birds and their populations that are obligates to the riparian habitat. The remaining part of the section is to discuss the effect of the project on potential research opportunities. Since the project is an unidirectional project, future research opportunities will be lost. The appendix of the report covers the observed wildlife from four canoe trips.

Since desert riparian habitat is very restricted and constantly challenged by water developments in arid regions, intensive biological studies should begin along the White River immediately, before oil shale production and water withdrawals in Utah and Colorado begin. Parallel studies should begin on other Utah desert stream to

- 33.9 evaluate the habitats and wildlife productivity. The DEIS made a very good beginning in the biological productivity of the habitat with some of the game animals as geese and deer. The proposed studies would expand this beginning to include every major species in the region. Will a decrease in bird population as the robin and yellow warbler occur? Will the dam affect the wildlife downstream from the dam and in what manner? Will the reservoir increase the number of gnats in the summer and hinder recreation? A good baseline population study is needed to answer these questions.

In Utah only the Virgin River is comparable to the White River in complexity of the riparian habitat. Most streams in Utah as the Escalante, Muddy, San Rafael, and Dirty Devil flow through steep canyons that do not leave much room for a diverse wildlife habitat (canyon wren country). In other places the streams flow through open area with the sagebrush joining the riparian habitat at the river bank. The White River meanders down through gentle cliffs and in the meanders a flood plain has developed over the years. Usually there is to a varying degree a cottonwood forest in each of the meanders. Population census work would require a minimal of five years and should include the entire White River from Rangely to the Green River confluence. These studies are not necessary for the EIS but should be concluded

- 33.10

33.10 before any right-of-way permits are given out. Likewise since oil shale history (cont.) is in the making, these studies should be continued for the duration of the oil shale development.

33.11 Since there are some who have not yet associated the loss of habitat with loss of wildlife, all the deer in the White River region from Rangely to the confluence should be radio-tagged and monitored during the construction of the dam. Each deer should be studied, movement followed, and autopsy performed. The effects of the loss of habitat should be determined from this study. The Division of Water Resources should fund the study and the National Academy of Sciences and the Smithsonian Museum should monitor the study and publish the results. A similar study would be performed with the beaver population along the White River.

The beaver provide some unique opportunity for study. Beaver have been observed feeding (?) in the rocks in the White River rapids. Are the beaver after algae or roots or invertebrates? While the beaver are in the rapids, one can approach to within a few feet of them, providing the canoe does not hit the rocks. The beaver ecosystem seems very stable. This is in contrast to the San Rafael River below the wedge where it seems that beaver within the last ten years reentered the region. In the San Rafael, beaver have cut down every tree (Fremont Cottonwood) in some of the few flood plain forest that exist. Along the White River cottonwoods are only occasionally attacked. More analysis is needed on the White River beaver population for baseline data. Once the reservoir is completed, will the displaced beaver population start to cut down the adjacent forest of cottonwood trees? Will the tamarisk replace the flood plain cottonwood saplings and with this loss of food result in beaver cutting down the larger cottonwood trees? These changes should be monitored for the duration of oil shale development in the region.

33.12 Other types of studies that would be lost with the reservoir are a series of studies dealing with the prehistoric biological populations. One such study would age all the old trees in the region with  $C^{14}$  or tree ring dating or both. One would also age the trees which the beaver cut down and determine at what time the beaver cut down these trees. This information could tell whether the past beaver populations was as abundant as the present beaver populations and perhaps even how long the beaver populations have been in the region. The rate of stream bank erosion can also be estimated from the study of the beaver cut logs (See the illustration in the appendix).

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33.13 A second related study would examine all the pack rat nest in the region and determine the date of the nest, and the plant and animal contents of the nests (See Thomas R. Van Devender and Jim I. Mead, 1978, *Copeia* 1978:464-475. Early Holocene and Late Pleistocene Amphibians and Reptiles in Sonoran Desert Packrat Nidens). These studies would tell us about the other animals and plants that existed in the region as far back as 30,000 years ago. There is one pack rat nest at the dam site. The combination of these two studies would tell us much about the prehistoric biological communities in the White River region. Together with the modern study of the biological community and its productivity, the knowledge can piece together and monitor future changes. A dam and reservoir (and even oil shale development) would destroy this opportunity now.

#### IV

##### Measuring the Recreational Losses

33.14 The destruction of the riparian habitat by the reservoir would displace and destroy numerous mammals, numerous birds, numerous reptiles and amphibians, and numerous fish. Trout and/or bass may be substituted for the present biological diversity. The result is a tremendous loss of biological value and consequently recreational value. Fishing opportunity may not be better than the present catfishing. Boating opportunities may not be better than the present water-related recreation in the region. There has been no statewide study on boat recreation on small streams. No measure of loss due to the dam can therefore be evaluated. It is important to complete such a study. Commercial river runners and public lands river management plans have restricted greatly the use of rivers by recreationists who do not have six months to plan their outings. More and more recreationists are now searching for small rivers that do not have motors or restrictions placed on them (Note the increase use of the San Rafael River by river recreationists). Most of the small rivers in Utah can be utilized only for a week at the most- during the spring flooding (if the upstream users do not capture all the spring run-off). The White River is an exception in this case. Below concerns a measure of canoe recreation on the White River in relationship to what is available in Utah. Since canoeing is an infant recreation in Utah, the best available data and impressions are presented. If any other better data is available, it should be included in the Final EIS. The appendix includes the trip description of four canoe trips on the White River.

The White River offers unlimited canoeing opportunity for beginners in April, July, August, September, and October and for advance canners from April through October. One could readily spend a week on the river between Rangely, Colorado and the confluence of the White with the Green River and still desire to return for a repeat trip. One day trips also exists (Cowboy Canyon to Ignatio Bridge). Before recreation becomes popular, a good river management plan must be instituted so that recreationists are not permitted to interfere with critical wildlife breeding. It is asked that the White River be recreated by permit only or be declared off-limits during critical seasons of wildlife.

33.15

33.16

TABLE 1. SMALL RECREATIONAL STREAMS IN UTAH: opportunity for canoeing.

River	Difficulty	Scenery	Miles	Canoe days	day-miles
Weber	b	N	7	7	
Provo	7	h	2	7	
Strawberry	b	h	7	7	
Wasatch	c	7	7	7	
Sevier	7	h, od	7	7	
Price	a	c, od	7	7	
White	b/a	oc	80	210	16800
San Rafael (Wedge)	b	cw	18	7	126
Muddy	b	cw	18	7	126
Dirty Devil	7	d	7	7	
Escalante	a	cw	100	7	700
Virgin	a	cw	20	30	600
San Juan (above Mexican Hat)	b	od	50	240	12000

Difficulty: a, advance; b, beginner. Scenery: h, mountain valleys; oc, open canyons; od, open desert; c, canyon; cw, canyon walls; d, desert. Day-miles is calculated from the number of canoeable miles multiplied by the number of days one can canoe the stream.

Table 1 lists the small rivers in Utah and rates them to difficulty, scenery, number of estimated miles, and number of days one can recreate on them (Some of this data is taken from Les Jones study on recreation rivers). This data is very preliminary. It shows that the White River and the San Juan River are the two major beginning canoe rivers in Utah with the White River having 16,800 day-miles available and the San Juan having 12,000 day-miles available for canoeing. Canoeing on the Green and Colorado were not considered for the beginning portions of these rivers

are largely flat water, prone to large waves and winds, and offer a very different recreational opportunity. Furthermore, recreational opportunities can be doubled on small streams since both banks of the river can be observed for wildlife instead on one bank on a large river- if one is not confined to the middle of the stream.

33.17

The OHS addresses the fact that the quality of canoeing and rafting would be reduced in the 13.5 miles of the reservoir. This loss would not be mitigated. The diversion dams (as those needed by Tosco and the Ute Indians) would further reduce the canoe and rafting experience (Further discussion on these Diversion Dams should be included in the Final EIS). The stream below the reservoir would need at least 300 cubic feet per second of water for rock bottom canoeing. For recreation canoeing, a minimal water requirement is 400 cubic feet per second of water. Canoeing is not limited to the spring runoff. In September one group went from Cowboy Canyon to Ignatio Bridge and completed the shuttle with ten-speed bicycles back to Cowboy Canyon.

The affect of the reservoir on canoeing would affect the recreation on the entire White River, not just the 13.5 miles. There is a certain elation when one starts a 80 mile canoe trip and survives without motors and radios. There are very few streams in United States where a 80 mile canoe trip can be taken. Then when the finest campgrounds in Utah exist along the river together with some of Utah's finest hiking and panoramic views, a reservoir, unlike road crossings which are quickly forgotten, would be very disruptive to the entire river.

Years ago the State ignored cross-country skiing and opted for the promotion of highly commercial and energy consumptive recreation as snowmobiling, motor cycle and ORV events, and down hill skiing. Yet cross-country skiing is the fastest growing sport in Utah and is very popular. Only recently has the state recognized that cross-country skiers had different requirements than snowmobilers and down-hill skiers- the needs for clean air, solitude, and silence. Canoeing presently rates with the state much as cross-country skiing did 15 years ago. Unlike most other forms of recreation, canoes were actually used to develop North America (Some other forms of recreation developed out of countries at war). Explorers, traders, and trappers travelled from New Orleans, Montreal, and the Hudson Bay to the mouth of the Yukon River. Recreationist are now doing these historic routes today by canoe. Historians are also repeating these historic routes. Canoeing is an upstream sport in America. Building a reservoir on the White River could destroy 38% of the beginning canoe streams in Utah. The White River offers unlimited opportunities to recreate and feel as an early American trader or trapper.

#### EVALUATION OF STATE POLICY TOWARD WATER, RECREATION, AND WILDLIFE

Although it is not expected that the DEIS should analyze the States policy toward water, recreation, and wildlife, it is included here because the State proposed the Water Project, the State has control over the water, and the State has control over wildlife. From the analysis presented in this report, it is concluded that once an energy project or water project is proposed, the State does not allow any agency as Division of Wildlife Resource and the Division of Parks and Recreation to evaluate the region to determine if the region has greater value than the proposed water project or the proposed energy project. The project planner does not provide any funding for other agencies involvement in the preliminary planning. Once an energy or water project is proposed, the State loses objectivity in its planning.

After the Federal Government via the Bureau of Land Management sponsors the initial Environmental Impact Study- something the state should have done fifteen years ago on the White River Project- the State will bow over the analysis of the study and run to Washington to remove any further interference into the project, even when the State proposes the worst alternative and may be the most costly alternative in the long run. The State does not have a single agency whose main function is to protect the environment for use by the future generations. This is shown with the conflicts concerning archeological values in southeastern Utah. This is shown by the lack of planning for oil shale development (the State should be insisting on an Environmental Impact Study before the oil shale companies start to dig). This is shown with the State's total disregard for riparian habitat and wildlife and stream recreation. It is ironic that one State agency (Division of Water Resources) can borrow \$18,000,000 to destroy wildlife and its habitat while the Division of Wildlife Resources depends on sportsmen for 96% of its revenues. This type of policy can only destroy wildlife and recreation activities in Utah.

Bio-West and the Bureau of Land Management are to be complimented on this White River Draft Environmental Impact Statement. The State, on the other hand, have planned this project for 15 years and have yet to learn how to utilize its highly professional staff.

#### RECOMMENDATIONS

Since the biological opinion on the endangered species of fish has not been available at this time, it is impossible to prefer one alternative over another, except Alternative 2, of NO ACTION. When the biological opinion on the fish is completed, it is hoped that a public hearing is available with the Fish and Wildlife Service and the Division of Wildlife Resources explaining the viability of the species under each alternative.

- 33.18 Since the White River Dam is the most destructive and unilateral, it is recommended that no permits for the dam construction be given until all the research opportunities have been completed on the riparian habitat. The Division of Water Resources should be the funding agency for this research and the National Academy of Sciences and the Smithsonian Museum should be the monitors of this research.

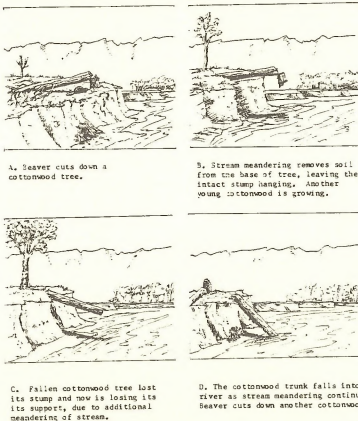
Since there is no knowledge concerning the demand from the oil shale developers for water and no plan of operation for oil shale development, it is recommended that no permits for the White River Project be given until such a plan is filed and until all the plans for all the oil shale developers are synchronized.

It is recommended that the streams in Utah be studied for their riparian wildlife use and for their recreational use before any permits for unilateral action on streams are given.

It is recommended that the State and the Utes meet often and have the State listen to the Utes and find out what the Utes know and want. So far the State has only told the Utes that the Project is needed. The State should furnish the Utes all the available information so the Utes can determine and plan their water needs.

It is recommended that the State form an Environmental Protection Agency that prevents all previously poor planning of water projects and energy projects and can actually veto planned water projects and energy projects without the Governors complaints.

FIGURE 1. A series of scenes taken from slides and rendered consistent to sequential interpretation: History of a Fremont Cottonwood along the White River. Illustration by N. Pettis



By knowing the date that the beaver cut down the tree, one can measure the stream bank erosion rates. By examining the date of all the beaver cut trees, one might estimate the prehistoric beaver populations along the White River.

Wildlife Observations from Four Canoe Trips along the White River

33.19

Fifty-one birds have been observed along the White River on four different trips. Great Blue Herons were common during the end of August, but were not observed in May, September, or October. Mallards and other large dabblers and teal were always observed. Canada Geese and American Merganser were seen in May and October. At the end of September and the first of October large flocks of Sandhill Cranes were seen (114 individuals in one flock). Golden Eagles were always seen. Kingfishers were seen in May and in October. Most of the songbirds were seen in May with very few observed in August, September, or October. A Green Heron and Semipalmated Plover were noted, but circumstances prevented good observations. The birds listed below were all noted in the riparian zone.

Hared Grebe	Flicker	Water Pipit
Great Blue Heron	Hairy Woodpecker	Starling
Canada Geese (N)	Western Kingbird	Solitary Vireo
Mallard	Say's Phoebe	Yellow Warbler
Green-winged Teal	Flycatcher	Yellow-rumped Warbler
American Merganser	Horned Lark	Wilson's Warbler
Red-tailed Hawk	Barn Swallow	Western Meadowlark
Golden Eagle	Cliff Swallow (N)	Northern Oriole
Kestrel	Maggie	Cowbird
Accipiter	Raven	Western Tanager
Sandhill Crane	Crow	Lazuli Bunting
Killdeer	Pinyon Jay	House Finch
Spotted Sandpiper	House Wren	Goldfinch
Mourning Dove	Rock Wren	Southern-sided Towhee
Great Horned Owl (N)	Robin	Lark Sparrow
Poor-will	Mountain Bluebird	Dark-eyed Junco
White-th. Swift (N)	Blue-Gray Gnatcatcher	White-crowned Sparrow
Kingfisher	Ruby-crowned Kinglet	

Beaver, deer, wildhorses, cottontails, porcupine, coyote, and deer mice were noted from the river. Deer are the most conspicuous mammal. Gopher snakes were noted in August, September, and October. The late observations of the Gopher Snake along the river may indicate that the snake hibernates in the riparian zone of the White River.

Canoe Notes from Four Trips along the White River

Date	Trip	River Flow	Time*
May 21, 22, 1977	Cowboy to Asphalt	300 cfs	
August 30, 31, Sept 1, 1980	Cowboy to Mtn. Fuel	340 cfs	18 hours
Sept. 29, 30, 1979	Cowboy to Asphalt	270 cfs	12.5 hours
October 4, 5, 1980	Ignatio to Mtn Fuel	300 cfs	15.5 hours

\* Time includes much stopping in the riparian zone

Of the 22 canoes that have made the trip, only 2 canoes filled with water. Trips have included people over 60 and under 3 years of age, people who have been on expeditions on tropical rivers and people who never have been in a canoe.

## Response Letter 33

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33.1 Thank you for the information. It is included in this Final EIS.

33.2 Your comments have been recognized in the preparation of this Final EIS.

33.3 The costs for Alternative 1 stated in Appendix 4 (Appendix 6 in this Final EIS) do not include generation equipment costs. As proposed, the power plant would be constructed by the proponent or by an electric utility under agreement with the Utah Division of Water Resources. As you indicate, the cost of construction and operation would have to be paid from the estimated revenues stated in Appendix 4. Thus, the net revenues would be less than those gross revenues. However, construction and operation of the hydroelectric power plant would produce electric power economically (see Comment Letter 17).

Prior to construction of the power plant, the applicant would need to satisfy the licensing requirements of the Federal Energy Regulatory Commission. See Letter Response 37.9 for details.

33.4 The sediment-producing area is considered to be 4,020 square miles (the drainage basin for the White River upstream from the dam). The sediment sources are not pinpointed in this EIS because sedimentation is considered to be somewhat general over the entire basin. The measurements to collect sediment data are historically taken in the streamflows and related to mean annual flows.

You are correct; increased development and associated surface disturbances could cause increased sedimentation. Should development take place in the White River Basin (or any arid region with high sedimentation rate potential), land use development would likely require erosion control and sedimentation reduction measures.

For further information, refer also to Oral Testimony Response 8.

33.5 See the revised Chapter 1, Purpose and Need section, of this Final EIS for additional information regarding water requirements for oil shale development.

33.6 The cost of water from the reservoir does not include the costs of industrial pump stations and pipelines. An assumption used in preparing this EIS was that pipelines and pumping stations required by various developers would not be discussed, but would be handled in separate environmental analyses. The components evaluated in the Draft EIS are listed on pages 10-11 of that document.

Alternatives 4 and 5 discuss methods for using water from Fleming Gorge Reservoir.

33.7 Oil shale developers' request for water from the proposed White River Dam and Reservoir Project would be filed with the Utah Division of Water Resources. BLM cannot require such plans for inclusion in the Final EIS. Those projects listed in the EIS have indicated such requests (see Chapter 1, Purpose and Need section). The companies have submitted development plans to BLM for inclusion in the forthcoming Uinta Basin synfuels EIS.

33.8 See Oral Testimony Response 13 and Letter Response 33.9.

33.9 Suggested studies of biological productivity that would include every major species in the region; population studies that would use radio telemetry, perform autopsies, and monitor density change; nesting studies of all pack rats in the region to determine nest plant and animal contents; and studies of prehistoric biological communities that would use C<sup>14</sup> and/or tree rings for dating would be interesting, informative, and of scientific value to certain individuals. However, it is not the intent of the NEPA process to write an EIS on this level of detail unless issues that are truly significant to the proposed action warrant this extensive coverage. The EIS is intended to analyze the public concerns based on the nature and number of comments, and concentrates effort and attention on important issues determined from public responses, rather than amassing needless detail. Based on the nature and number of public comments, a determination on the level of detail needed for suitable EIS coverage was made and this excluded pack rats.

33.10 Recent studies during 1981 in the White River concerning the Colorado squawfish and other rare fish species have included habitat in both Colorado and Utah. Many biologists recognize the need for additional information concerning the aquatic ecosystem in the White River, particularly for those species classified as either threatened or endangered.

The Colorado Squawfish Recovery Plan, for example, prepared by the FWS, advocates study of this species and its habitat, which includes major portions of the White River.

33.11 See Letter Response 33.9.

33.12 The FWS stated in its Technical Assistance Report (Appendix 10 in this Final EIS) that up to 176 beaver within the reservoir area would be lost and that there would be no feasible way to mitigate this loss. It is expected that a small portion of the displaced beaver population would move into areas above and below the proposed reservoir site and utilize cottonwood germination downstream from the dam, and an increase in the cottonwood population would be expected.

See Letter Responses 5.9, 25.10, and 33.9.

33.13 See Letter Response 33.9.

33.14 Thank you for your comment. It is recognized that the White River in Utah offers good to excellent canoeing opportunities. The Recreation section of Alternative 1 in Chapter 4 has been revised and expanded in this Final EIS to better evaluate the impacts on this and other recreational activities.

33.15 The area including that portion of the river which would be affected by the White River Dam Project is within the Bonanza and Rainbow Planning Units. The impacts/conflicts with the BLM Management Framework Plans for those planning units are discussed under BLM Land Use Plans in Chapters 3 and 4 of this Final EIS.

No critical terrestrial wildlife areas were identified within the potential impact area where recreational activities could pose a threat

33.15 (cont.) to wildlife populations. That, and the limited recreational use of the area, preclude the need for permit systems to limit or control recreational use. If recreational use increased to the point where wildlife populations were threatened, then measures such as you propose would be warranted.

33.16 Thank you for your comment. This information will be used in the decision-making process. Also, see Letter Response 33.14, Oral Testimony Response 20, and the revised Recreation section of Alternative 1 in Chapter 4 of this Final EIS.

33.17 The loss of 13.5 miles of canoeing stream would only be partially mitigated by the construction of a boat ramp at Ignacio, a take-out point at the dam, and access to the river below the dam. The Ute Indian irrigation diversion could constitute an additional canoeing obstacle. The revised anticipated withdrawals and effects on flows at the diversion are presented in the Recreation sections, Chapters 3 and 4 in this Final EIS. Available information indicates that the minimum flow for canoeing is 300 cfs and that flows above approximately 350 cfs provide good conditions. Normally, flows in August and September are less than 400 cfs.

The direct effects of the project on canoeing would extend from the reservoir inlet to the river mouth (due to the reservoir and regulated flows). Indirectly, utilization of upstream portions of the river could also be affected. However, due to private ownership and Colorado laws regarding stream recreation, there is minimal canoeing activity on the Colorado portion of the river. Therefore, impacts on canoeing on upstream portions of the river would probably be minimal.

33.18 Thank you for your point of view concerning the need for research on the White River riparian habitat. The decision-makers will judge the adequacy of available information prior to granting permits for the proposed project or alternatives.

33.19 Thank you for the information. The views expressed will be considered in the decision-making process.

*Re: White River Dam Project*

34.1

*I recommend that the BLM adopt alt. 2: permits should be denied until a master plan for the White River is developed, oil shale technology is further advanced, oil shale industries needs for water are determined and alternate dam sites are investigated.*

*Gratchen Anderson  
PO Box 1464  
Carley, Wash 97055*

## Response Letter 34

34.1 The views expressed will be considered in the decision-making process. For information about water needs, see the revised Chapter 1, Purpose and Need section, in this Final EIS. For information regarding alternate dam sites, see the Introduction to Chapter 2 and Figure 2-2 of this Final EIS. Also, see Letter Response 25.2.

For information on a master plan and oil shale technology, see Oral Testimony Response 6 and Letter Responses 42.2 and 47.1.

## Comment Letter 35

2325 Gros St.  
Boulder, Colo 80302  
Feb. 5, 1981

Dearest Thomas,  
Thank District Office  
Bureau of Land Management  
170 S. 5th St  
Salt Lake City, Utah 84143

Dear Sir:

35.1

In a variety of reasons, not least of which is the  
absence of any long-term water plans by the oil shale  
corporations; I would recommend Alternative #2,  
No Action, in the EIS for the proposed White River  
Dam in Utah.

Thanking you for your thoughtful consideration on this  
critical environmental issue, I remain

Sincerely yours,  
Michael P. Decker

## Response Letter 35

- 35.1 The views expressed will be considered in the decision-making process. For more information about water needs, see the revised Chapter 1, Purpose and Need section, in this Final EIS. Also, see Oral Testimony Response 6.

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## Comment Letter 36

STATE OF COLORADO  
Richard D. Lamm, Governor  
DEPARTMENT OF NATURAL RESOURCES  
**DIVISION OF WILDLIFE**  
Jack R. Grieb, Director  
8000 Broadway  
Denver, Colorado 80216 (825-1192)



February 6, 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
170 S. 500 East  
Vernal, UT 84078

Dear Sir:

Division personnel have reviewed the Draft Environmental Impact Statement for the proposed White River Dam Project in Uintah County, 40 miles south-east of Vernal, Utah.

Since we are not that well acquainted with the proposal or the area, we will make only some general comments.

Based on the information presented in the Environmental Impact Statement, it would seem the project could have some adverse impacts on the endangered fish species in the White River and on some raptor species that hunt in the area. Terrestrial wildlife would, quite obviously, be displaced by the reservoir.

- 36.1 There could be some spin-offs from the project which could reach Colorado but we do not believe the spin-offs will cause adverse impacts. Some deer may possibly move into Colorado and cause a temporary winter range problem but it is rather unlikely this would occur. We, also, do not believe that fish planted in the reservoir will migrate upstream or at least not as far as Colorado. Colorado also has some of the same endangered fishes but we do not believe that project could have impacts on their habitats.

The Draft Environmental Impact Statement does, in our opinion, present objective evaluations of probable impacts, both adverse or otherwise, and does suggest some possible mitigative measures.

We appreciate being given an opportunity to comment even though the proposal will be in Utah.

Sincerely,

*Ivan I. Wescoat*

IIM:jb  
cc: NW Region  
Utah Division of Wildlife  
Resources

Ivan I. Wescoat  
Wildlife Program Specialist

DEPARTMENT OF NATURAL RESOURCES, Monte Ponce, Executive Director • WILDLIFE COMMISSION, Wilbur Redden, Chairman  
Donald Fernandez, Vice Chairman • James Smith, Secretary • Jean K. Tod, Member • Vernon C. Williams, Member  
Michael Higbee, Member • Sam Coudal, Member • Richard Diebel, Member

## Response Letter

- 36.1 The views expressed will be considered in the decision-making process. See Appendices 4 and 10, FWS Biological Opinion and Technical Assistance Report, in this Final EIS for more information regarding wildlife species and habitat.

## Comment Letter 37

February 5, 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 900 East  
Vernal, Utah 84078

Draft White River Dam Project  
Environmental Impact Statement

Your File #1792

Dear Sir:

This is to submit to you the comments of the Colorado River Water Conservation District (River District) on the above referenced draft environmental impact statement. The River District is the primary Western Colorado Water policy body and includes within its boundaries the Yampa, the White the mainstem Colorado and the Gunnison Rivers.

- 37.1 A general comment is in order to make the document more usable we suggest that the pagination include the chapter number as a preface to the page number for example, all the pages in Chapter 4 would be number 4-1, 4025 etc. This would be helpful in reviewing the document and we suggest that the final environmental impact statement adopt that kind of pagination. The remainder of our comments address the subjects of the draft environmental impact statement in the order in which they appear in the statement.

### SUMMARY

- 37.2 Page 2: In that part of the introduction which carries over to page 2 in the third full paragraph we find the language "In preparing this draft environmental impact statement (EIS), BLM has noted several interrelated projects which would contribute to cumulative impacts to the region and the Upper Green River system." As the Department of Interior is, or should be, aware the United States Congress has on several occasions expressed its intent that the Department of Interior is not to address cumulative impacts of several existing potential projects in the Colorado River Basin. Instead the Congress has found that individual site specific statements are preferable.

- 37.3 In the last paragraph in the Introduction section on page 2 there is a discussion addressing the fact that "There is at present no specific compact between Colorado and Utah concerning the White River. Therefore, the allocation of water for emerging water consuming projects is not presently subject to any special interstate arrangement other than the overall provisions of the Colorado River Basin and Upper Colorado River Basin Compacts". In fact, Utah elected in the Upper Colorado River Basin Compact of 1948 to take its share of the waters of the Yampa and White Rivers originating in Colorado from the Yampa River and this is the reason for the provision the Colorado will not reduce the flow of the Yampa River below five million feet in any 10 year period at the Maybell Gage on the Yampa River. The effect, of course, is that water users in Colorado can fully utilize the entire flow of the White River.

Environmental Consequences of the Proposed Alternative Actions.

- 37.4 Page 3. The first full paragraph in the top right-hand column has a comment concerning the cumulative loss of flows which it is claimed "could adversely affect the continued existence of the Colorado squawfish". There is no documentation for this conclusion and the documentation should either be included or the entire paragraph must be stricken.

- 37.5 Alternative No. 3: Pumping from the White River and Augmenting From Hell's Hole Canyon Dam.

The first full paragraph at the top of page 4 again addresses "cumulative impacts" and is related to the Colorado River squawfish and this paragraph should likewise either be substantiated or must be stricken.

Unresolved Issues

- 37.6 Page 4. In paragraph 2 we find the language "The eventual consumptive use of water from the White River and its tributaries in Colorado has not been determined". This is not correct. Colorado water users will ultimately beneficially use all of the waters of the White River adjudicated by the Colorado water courts and those decrees total to all or substantially all of the flow of the White River. The assumption must be made that the entire flow of the White River will be consumed in Colorado. In the last sentence we find "The major environmental concern appears to be the cumulative impacts of this project and others proposed within the Upper Green River system". Again it is the intent of the United States Congress that the individual environmental impact statement are the intended way these issues shall be addressed.

Chapter 1 - The purpose and Need of the Proposed Action.

Other Issues

- 37.7 Page 8. In the last paragraph, left-hand column we find: "The White River along with the Yampa River, are the only unregulated tributaries of any size remaining in the upper Colorado basin". Our comment here speaks in specifics to the Yampa River which is not an unregulated tributary. There are 4 dams across the main stem of the Yampa with storage totalling 23,812 a.f. There are 110 dams with reservoir storage on the tributaries of the Yampa. There are approximately 100 diversions from the headwaters of the Little Snake with absolute decrees totalling approximately 17,000 s.f. The same applies to the White River at a somewhat different order of magnitude. In the final environmental impact statement please correct this inaccuracy.

Interrelated Projects

- 37.8 The bottom right-hand column on page 8. There is a statement: "The uncertainties of location, schedules, and the lack of definite information discourages further discussion in this EIS . . ." A bond issue has been approved by voters of Water Users Association No. 1 for the construction of a 13,800 a.f. reservoir at the Taylor Draw site of the Rangely Reservoir project. If there is any uncertainty it is founded in large measure in the opposition by the Department of Interior.

Chapter 2. Description of Alternatives

Hydroelectric Power Plant

- 37.9 Page 22. There should probably be discussion however brief, of the FERC licensing process in this section. The only place there appears to be any reference to the FERC is at page 152, Appendix 1.

- 37.10 Table 2-1, Comparative Summary of Significant Unavoidable Adverse Impacts. (pages 39-47 inclusive)

At page 42, (Alternative #1) there is language discussing cumulative loss of flow in the Green River and its possible effect on the Colorado squawfish and perhaps the humpback chub and razorback sucker. This appears to be speculative and the supportive data should be included or the comments should be stricken.

Chapter 3. The Affected Environment

## Response Letter 37

Page -4-  
BLM District Manager  
February 5, 1981

### 37.11 Surface Water, Hydrology

Page 51, in the third full paragraph in the right-hand column we find the following language, "There is presently no interstate compact between Colorado and Utah regulating the use of waters from the White River. Therefore, the possibility exists that White River flows in Utah could be altered (i.e. reduced) by an unknown amount by future potential upstream activities in Colorado." An additional comment should be included to the effect that Colorado decreases when built upon will in effect result in no or very little flow of the White River to Utah and probably not enough to provide a water supply from the White River.

### 37.12 Threatened, Endangered, and Sensitive Fish Species in the White River.

Page 66. There should be a discussion of definition of the term "sensitive". The term "sensitive species" is included in the glossary at page 199, however, it does not include the citation (Act of Congress or otherwise) which may direct the Department of Interior to address "sensitive species" and it does not include the criteria by which a species may be a "candidate" for the endangered species list. The final environmental impact statement should address this issue.

#### Chapter 4, Environmental Consequences

### 37.13 Threatened, Endangered, and Sensitive Fish Species in the White River.

Page 110, in the first full paragraph in the right-hand column we find near the bottom of the paragraph, "Since squawfish use these tributaries and until contrary information is gathered, the White River must be considered important to this endangered species." In the final environmental impact statement please include a copy of the Federal Register Notice wherein the White River was designated critical habitat, otherwise there appears to be no scientific basis for the statement and it should be deleted.

### 37.14 Page 112. Under the heading "Threatened, Endangered, and Sensitive Fish Species in the Green River", near the top of page we find "Both areas contain many dams but the Green River still has the Yampa and White Rivers as free-flowing tributaries in addition to releases from Fleming Gorge Reservoir, and therefore still retains a more natural flow level. . . ." Please see my reference above concerning the storage and diversions and correct your language accordingly.

Thank you for the opportunity to comment.

Very truly yours,

*Richard C. Fischer*

ROLAND C. FISCHER

Secretary-Engineer

RCT/ems

37.1 Standard page numbering was used to aid the reader in locating specific sections listed in the Table of Contents. Standard page numbers also reduce printing time and cost. Chapter titles are printed at the top of each page (a running head) to help the reader know what chapter any page is in.

This is a site-specific impact statement; however, this does not mean that cumulative actions can be ignored.

37.2 The guidelines for EIS preparation are contained in the National Environmental Policy Act regulations. Those regulations, published in the Federal Register, (November 29, 1978) direct (paragraph 1508.25(a)(2) and (c)) that the scope of the EIS will include: "Cumulative actions, which when viewed with other proposed actions, have cumulatively significant impacts and should therefore be discussed in the same impact statement." and "Impacts, which may be: (1) Direct. (2) Indirect. (3) Cumulative."

Further, paragraph 1508.27(b)(7) of the regulations states, with regard to the significance of impact, the evaluation should consider "Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment."

Paragraph 1508.7 gives the definition "Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

These regulations are the implementing procedural provisions of the National Environmental Policy Act passed by Congress and signed by the President. They are binding on all Federal agencies and mandate what is considered and included in EISs. Therefore, we included cumulative impacts in this EIS.

37.3 The White River Dam Project as a water supply for energy development for oil shale, tar sand, and power generation is an issue between the States of Utah and Colorado.

The amount of water that can be made available for the project from the White River in Utah depends on the amount of future water development and the amount of water that would be released from Colorado into Utah.

Controversy has arisen over assumptions on "reasonable" levels of future water use for the White River Dam Project. Utah's position is that a guaranteed source of water for the entire life of the project is available and future upstream use would not reduce the amount of water essential for the White River Dam Project. Studies by Fields (1975) and Western Engineers (1979), concluded that, even during drought years with liberal assumptions of upstream water development and a minimum annual average of 223,000 acre-feet at the USGS Gage near Watson, the White River Dam Project would supply sufficient water for energy development needs and power generation.

37.3  
(cont.)

It is not known whether Colorado would be obligated to honor a water right granted to the Ute Tribe in Utah by the Winters Doctrine, a Federal decree given in 1882. The Winters Doctrine does not specify a definite amount of water but ensures that the Ute Tribe in Utah has a right to substantial quantities of irrigation water from the White River. The amount of water is not yet agreed upon by the Ute Tribe and State of Utah. The priority date of the Ute water rights is not firmly established, but will most likely be either 1882 or 1948. Utah is presently meeting with the Tribe to reach an agreement on Tribal water needs and involve them in the water project. Utah feels that the Tribal water availability will be more Firm with the dam and reservoir operation.

It is likely that Winters Doctrine claims would be chargeable to Utah's apportionment of Colorado River Basin waters because the Reservation is within Utah. This would be consistent with the precedent established by the United States Supreme Court in *Arizona v. California*, 373 U.S. 546, 83 Sup. Ct. 1468 (1963). Thus, while the water probably would not be chargeable to Colorado, it does not necessarily follow that Colorado would be free to take action within its boundaries that would prevent the Tribe from satisfying any Winters Doctrine entitlements. It is doubtful that the courts would permit use of water in Colorado that would nullify legitimate Winters Doctrine entitlements of Indian Tribes located in Utah. Of course, the precise issue has not been considered by the courts and, until or unless it is, or the matter is otherwise resolved, uncertainty regarding it will continue.

As competition for use of water from the White River increases and if a dam is constructed as proposed, it is probable that some division of the water from the river between the two states will be made, either by compact or judicial determination. Because the White River flows partly in Utah and is a part of the Colorado River system, and because Utah is entitled to the use of a fixed amount of water from the system under the Upper Colorado River Basin Compact, it is doubtful that Colorado could consumptively use all of the water of the White River. At present, however, each State's specific entitlements in the river are uncertain and will have to wait for further efforts to determine them.

The need for reservoir storage is substantiated by Western Engineers (1979) who concluded that "in most years an adequate water supply exists, but in years like 1977-1978, there are periods when no water will be available without hold-over reservoir storage."

The BLM has concluded that the White River Dam Project could provide a reliable source of water for energy development in the Uinta Basin for the expected life of the project.

- 37.4 Dr. Paul B. Holden, BID/WEST, Inc., and other aquatic wildlife experts who have studied these endangered fish for years consider cumulative water losses as or more important than individual depletions. Dr. Holden addresses the importance of these cumulative effects on page 112 of the Draft EIS. References cited on page 202 of the Draft EIS document this.

See Appendices 4 and 10 of this Final EIS for more information.

- 37.5 Refer to Letter Response 37.4.

- 37.6 Regarding the cumulative impacts of this and other proposals, refer to Letter Responses 37.2 and 37.3. The question of compact and agreed-upon uses in the White River will have to be settled outside the scope of this EIS.

Please refer to Letter Response 37.3 concerning Colorado use of the White River.

37.7

The average annual flow of the Yampa River, as measured at Maybell, Colorado for water years 1971 to 1976 was approximately 1,176,500 acre-feet/year. The total 23,812 acre-foot capacity of the four dams on the main stem of the Yampa you reference is approximately 2 percent of that flow. On the average, April through July accounted for 85.4 percent of the annual flow. These figures indicate that the flow of the Yampa is essentially natural and unregulated, as stated in the Draft EIS.

With regard to diversions on the Little Snake, you state there are: "Absolute decrees totaling approximately 17,000 s.f." This amounts to 3.4 percent of the average annual flow of the Little Snake or 1 percent of the combined flows of the Yampa and Little Snake Rivers.

Thus, the numbers you provide do not reflect that the flow of either or both of these rivers is "regulated." Therefore, the statement quoted from page 8 is not inaccurate.

37.8

The Taylor Draw Reservoir is recognized as an interrelated project in the Draft EIS on page 8. The uncertainties spoken of are those on the Yampa, Little Snake, and Duchesne Rivers, as well as other potential projects in the Upper White River Basin. The statement that these and other projects are outside the scope of this EIS is still valid. These projects will require their own analysis for impacts. They are mentioned here to help the public understand the cumulative impact potential.

37.9

The Federal Energy Regulatory Commission (FERC) licensing procedures for construction and operation of a hydroelectric power plant, as would be the case with the White River Dam Project, would be as follows:

1. The applicant files a license application with numerous supporting data, including an environmental report (Exhibit E) describing the proposal, existing environment, environmental impacts, and mitigation/enhancement measures.
2. The FERC staff reviews the application for adequacy and NEPA compliance. Any deficiencies are corrected/revised by the applicant.
3. The applicant sends copies of the accepted application to local, State, and Federal agencies for review and comment and public notice is published in the Federal Register and local newspapers. Comments are sent to FERC.
4. The FERC staff evaluates the application and comments, prepares a report with licensing recommendations and drafts the license. The Commission acts on the application.

37.9 5. The approved license is issued and the applicant has a 30-day period to accept or seek a rehearing on the terms of the license. At the end of 30 days, the license becomes effective.

37.10 Refer to Letter Response 37.4.

37.11 See Letter Response 37.3.

37.12 BLM Manual 6840 mandates the intent of the sensitive species concept. BLM recognizes those plants and animals that merit special attention in BLM planning, environmental analysis, and decision-making processes.

A sensitive species must meet one or more of the following criteria according to BLM Manual 6840:

1. Plants or animals not yet officially listed but which are under study for listing (status review) automatically become sensitive species when the Federal Register notice so stating is published by the Secretary of the Interior or the Secretary of Commerce.
2. Plants or animals proposed for Federal listing by the FWS pursuant to Section 4 of the Endangered Species Act automatically become sensitive species.
3. Plants or animals whose numbers are declining so rapidly that official listing may become necessary as a conservation measure may be designated sensitive by using the procedures outlined in .33. Declines may be because of one or more of several factors including: destruction, modification, or curtailment of the species' habitat or range; overutilization for commercial, sporting, scientific, or educational purposes; disease or predation; the inadequacy of existing regulatory mechanisms; and/or other natural or manmade factors adversely affecting the species' continued existence.
4. Plants and animals whose populations are consistently small and widely dispersed, or whose ranges are restricted to a few localities within a given State, such that any appreciable reduction in numbers, habitat availability, or habitat condition might lead toward local extirpation or extinction may be designated sensitive by using the procedures outlined in .33. Certain species which occur on BLM-administered lands only at the periphery of their ranges may also be included.
5. Plants and animals that inhabit ecological refugia (i.e., an isolated habitat that has preserved suitable environmental conditions for those species adapted to it and is unique in its ecological and geographical position in a region) may be considered sensitive in that habitat type. Designation is made using the procedures outlined in .33.

37.13 Critical habitat can only be designated by the Secretary of the Interior or Commerce. The White River has not been designated as critical habitat, although Colorado squawfish have been found to use it. Please see Appendices 4 and 10 in this Final EIS for more information.

37.14 See Letter Response 37.7



IN REPLY REFER TO:

United States Department of the Interior

BUREAU OF MINES  
2401 E STREET, NW.  
WASHINGTON, D.C. 20241

February 4, 1981

Memorandum

To: District Manager, Vernal District Office, Bureau of Land  
Management, Vernal, Utah

From: Director, Bureau of Mines

Subject: Draft environmental statement for the White River Dam  
Project, Uintah County, Utah

- 38.1 Thank you for the opportunity to review this draft in which minerals  
and minerals impacts have been thoroughly treated. We believe that  
the energy production from the proposed project would be very much  
in our national interest.

*W. J. Keizer*  
Acting Director

- 38.1 The views expressed will be considered in the decision-making pro-  
cess.

Comment Letter 39

District Manager  
Vernal District of the  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

February 4, 1981

39.1

Dear Sir,

I urge you to protect and preserve the riparian wetlands of the White River. I urge this under the auspices of Executive Order 11790 Protection of Wetlands.

I strongly protest the selection of Alternative One from your Draft Environmental Statement. I ask you to select an alternative that will not destroy the riparian wetlands of the White River drainage, and urge you to take the necessary action to preserve the seasonal flows of the White River.

In conclusion I request that Alternative Two be selected as the preferable alternative.

Sincerely,  
Charles W. Silver

CHARLES W. SILVER  
P.O. Box 3142  
FLAGSTAFF, AZ  
86003

Response Letter 39

39.1 The views expressed will be considered in the decision-making process.

# Comment Letter 40

PETER P. BALOGH  
J. W. HOLMES  
ALBERT J. EDSON  
FRANK D. WALKER  
ROBERT M. JOHNSON  
GEORGE C. HALL  
NORBERT E. HALL  
W. STEPHEN FORD  
D. E. CLARK  
STANFORD FORDEN  
LESLIE H. BROWN  
ANTHONY J. HARTNEY  
PETER W. DEL LUNGO, JR.  
PAUL T. HENLEY  
PAUL N. BREWSTER  
THOMAS C. FRYBARGER, JR.  
J. BRENT GARFIELD

## FABIAN & CLENDENIN

ATTORNEYS AT LAW  
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REBECCY S. CLENDENIN  
800-1978  
SANDRA M. STODOLAND  
1000-1974

February 9, 1981

Lloyd H. Ferguson, District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, UT 84078

Dear Mr. Ferguson:

These comments on the White River Dam Draft Environmental Impact Statement are submitted on behalf of Tosco Corporation for your consideration.

Tosco Corporation, as noted at page 5 of the DEIS, holds oil shale leases on about 20,000 acres of land owned by the State of Utah about 10 miles downstream from the proposed White River Dam. Tosco plans to produce from these properties 50,000 barrels per day of hydrotreated shale oil using room and pillar underground mining methods and the TOSCO II surface retorting process. The project as currently planned will require 9,000 acre-feet of water per year (12.5 cubic feet per second). Shale oil production, however, may be increased, which would increase water usage up to 16,000 acre-feet per year.

Tosco plans to purchase its water from the Utah Division of Water Resources if the White River Dam is built. Although alternative water sources, such as appropriating water from the Green River or purchasing it from the U. S. Water and Power Resources Service's Flaming Gorge Reservoir, are available, obtaining water by those alternatives will be more expensive and energy consuming than obtaining water from the White River Dam. Tosco supports the proposed White River Dam (Alternative 1) as a reasonable, legitimate and beneficial use of the public lands. We offer these specific comments about the DEIS:

DAVID W. ELSON  
TERRY W. DANFIEL  
THOMAS A. ELSON  
CHARLES S. CHAPMAN  
BRADLEY A. HADLEY  
JOSEPH D. CHRISTENSEN  
DANIEL W. ANDERSON  
STEPHEN J. ANDERSON  
TERRY S. ANDERSON  
JAMES L. SMITH  
ROBERTA J. RELESS  
CHARLES J. HONLEY  
OF COUNSEL

Lloyd H. Ferguson, District Manager  
February 9, 1981  
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40.1

1. The discussion of the project's impact on air quality should be significantly expanded to include emission projections for all criteria pollutants under the Clean Air Act during construction and operation of the project. The lack of discussion of air quality impacts in the DEIS implies that projected emissions are insignificant. If so, it should be specifically stated with accompanying documentation.

40.2

2. In expanding the discussion of air quality impacts in the final EIS, particular emphasis should be paid to fugitive dust emissions during the construction phase. The discussion on mitigation measures for fugitive dust during construction (p. 30) warrants expansion and further detail.

40.3

3. The discussion of ground water as an alternative to the White River Dam in the DEIS is extremely limited. It may be that the quantity and quality of ground water are not sufficient for the projected needs of the shale oil industry. The discussion of ground water should be expanded to take account of the considerable amount of scientific literature available and should document more thoroughly why ground water is not a viable alternative to the dam.

40.4

4. The DEIS states (p. 55) that the quality of the ground water in the vicinity of "the tracts" is better than that of the Bird's Nest Aquifer of the Wasatch Formation. (This is incorrect; the Bird's Nest Aquifer is in the Upper Green River Formation.) It is not clear which tracts are meant. Moreover, there is no discussion of the usage implications for this higher-quality ground water. The DEIS presents no analysis of whether water of this quality could be used, for example, in the oil shale retorting processes planned for the area.

40.5

5. The brief discussion of possible contact between water in the proposed reservoir and oil shale outcrops (pp. 98-100), which suggests that the oil shale outcrops could cause water contamination, is based entirely upon studies of pyrolyzed processed shale, and not naturally-occurring raw shale outcrops. These studies do not provide a basis for implying, as the DEIS does, that contamination could result from contact with naturally-occurring raw shale. The discussion should be rewritten to reflect studies conducted on raw shale.

40.6

6. The discussion of terrestrial wildlife in the Affected Environment section (pp. 62-65), and in the subsequent Environmental Consequences section, refers to wildlife by common name but not scientific name. To decrease the likelihood of confusion, scientific names should be included.

Lloyd H. Ferguson, District Manager  
February 9, 1981  
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- 40.7 7. The DEIS does not discuss the impact of the White River Dam on reptiles, amphibians or insects. Although these impacts may be minimal, the final EIS should include at least a species list of amphibians and reptiles found in the area.
- 40.8 8. The DEIS (p. 62) states that pronghorns (*Antilocapra americana*) have not been seen south of the White River. Cook (Unpubl. observations, 1981), among others, has observed pronghorns there on many occasions. (Tosco Corporation will make the unpublished observations and data cited in this letter available to the EIS team on request.)
- 40.9 9. In Appendix 5, Table A (p. 178), the Colorado chipmunk (*Eutamias quadrivittatus*) is listed as being uncommon to rare and found only in pinyon-juniper habitat. Our own observations (Cook and Metz, Unpubl. data, 1981) show the Colorado chipmunk to be common in both riparian and desert-shrub communities which have rocky outcrops. These areas are located approximately 15-20 miles west of the proposed dam.
- 40.10 10. In Appendix 5, Table A (p. 174), the heather vole (*Phenacomys intermedius*) is shown as being uncommon to rare in both desert shrub and riparian habitats. It does not occur in the non-mountainous regions of Uintah County according to Durrant, 1952. *Mammals of Utah*, Univ. Kansas Publ. Mus. Nat. Hist. Lawrence, Hall and Kelson. 1959. *The Mammals of North America*. The Ronald Press Co. New York; Olsen, 1973. *Wildlife Resources of the Utah Oil Shale Area*. Utah Div. of Wildl. Res. Publ. No. 74-2; and Anon. Sept. 4, 1976. *First Year Environmental Baseline Report*. Federal Prototype Oil Shale Leasing Program, Tracts U-a and U-b, Utah White River Shale Project. U.S.D.I. Vol. 2. Please check your references to ensure that there is no mistake.
- 40.11 11. Thirteen species of birds listed in Appendix 5, Table B (p. 176), do not occur in the non-mountainous regions of Uintah County according to Anon. (1976); Behle and Perry (1975); Cook (Unpubl. data, 1981); Hayward, Cottam, Woodbury and Frost, 1976. *Birds of Utah*. Great Basin Naturalist Memoirs, No. 1. Brigham Young Univ. Press. Provo; Olsen (1973); and Twomey, 1981. *The Birds of the Uintah Basin, Utah*. Ann. 1942. Carnegie Mus. 28:341-490. They are:

1. Whistling Swan
2. Snow Goose
3. Barrow's Goldeneye
4. Sage Grouse

Olor columbianus  
Chen caerulescens  
Bucephala islandica  
Centrocercus  
urophasianus

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40.11  
(cont.)

5. Snowy Plover
  6. Yellow-billed Cuckoo
  7. Eastern Phoebe
  8. Bushitit
  9. Brown Creeper
  10. Bendire's Thrasher
  11. Black-tailed Gnatcatcher
  12. Chestnut-sided Warbler
  13. Rose-breasted Grosbeak
- Charadrius alexandrinus  
Coccyzus americanus  
Sayornis phoebe  
Psittiparus minimus  
Certhia familiaris  
Toxostoma bendirei  
Poliophtila melanura  
Dendroica pensylvanica  
Phoebe  
ludovicianus

These species should be checked to correct any mistakes in the table.

40.12

12. References cited in the DEIS were sometimes not included in the References Cited in Text section (pp. 201-204). For example, the following references listed in Appendix 5, Tables A and B, were not included in the section entitled References Cited in Text: Armstrong (1972); Durrant (1952); Durrant et al. (1955); Perry (1975); Hayward (1967); and Hayward et al. (1958).

40.13

13. Appendix 4, Tables A-E (pp. 165-170), summarize the cost of water on a per acre-foot basis for the different alternatives. It appears that in Tables D and E there is no accounting for water purchased from the Flaming Gorge Reservoir and pumped from the Green River. The cost of purchasing water from Flaming Gorge may increase the cost of water above the \$118.00 per acre-foot price projected.

In conclusion, Tosco Corporation supports the White River Dam as the most reliable and economical source of water in the area. It is Tosco Corporation's much preferred source of water for its shale project.

Very truly yours,

*Anthony L. Rampton*  
Anthony L. Rampton  
*Charles B. Camper*  
Charles B. Camper

CW

cc: Mr. Daniel F. Lawrence, Director  
Utah Division of Water Resources

## Response Letter 40

- 235
- 40.1 The impact to air quality from the White River Dam Project was considered and determined to be insignificant. Some dust and equipment exhaust containing pollutants would be emitted to the atmosphere, but the impacts would be short term and of small magnitude. It is generally recognized that the construction and operation of dams do not cause significant air quality impacts.
- 40.2 BLM considers the discussion on fugitive dust control (page 30 of the Draft EIS) to be adequate. Also, refer to Letter Response 40.1.
- 40.3 The discussion of groundwater is limited in this EIS because it was not proposed as a viable alternative. Your comments about groundwater are correct. Groundwater was considered to be too poor in quality, too limited, and, furthermore, not enough facts are known about it to satisfy the projected needs at this time.  
Please refer to Letter Responses 27.16, 27.17, 27.2B, 27.29, and 27.37 for further discussions on groundwater and assumptions used.
- 40.4 Your comment regarding the Bird's Nest Aquifer is correct. Chapter 3, Groundwater section, in this final EIS has been revised to reflect this information. For additional discussion on groundwater and the Bird's Nest Aquifer, see Letter Response 27.2B.  
The oil shale tracts referred to in this EIS are Federal Oil Shale Tracts Ua and Ub.
- 40.5 According to the USOI, Geological Survey (1981), it is not anticipated that serious contaminants would result from water in contact with raw oil shale outcrops. The Draft EIS did give some implications that contaminants from raw oil shale may be much the same as from processed oil shale. This is not correct. Studies show that processing of oil shale completely changes the structure of the shale. Oil shale processing releases certain heavy metals and trace elements that might be hazardous should they be allowed to come in contact with water sources. Recent studies by USGS show that the only significant leachate contaminants would be salt loads. Where water came in contact with raw oil shale outcrops, the shale areas might release salt loads for the first year or two after the reservoir filled. However, monitoring of these areas would be done in cooperation with State and Federal regulatory agencies. Please refer to Letter Responses 64.12 and 67.5 for other information.
- 40.6 The wildlife which were identified as significant through scoping or issue identification meetings are identified in the text and are, for the most part, well known by common names. Those who have questions concerning any of the species in Appendix 7 may contact the BLM or the state/federal wildlife agencies for clarification.
- 40.7 In the scoping process and in other meetings identifying issues, BLM ascertained that reptiles, amphibians, and invertebrates were not an issue and that the impacts related to them would not be significant. See Oral Testimony Response 13 and Letter Response 33.9.

- 40.8 Thank you for the information.
- 40.9 Thank you for this information.
- 40.10 Thank you for this information. The references were checked, and the information is correct.
- 40.11 Thank you for this information. These species were checked, and no mistakes were found in the table.
- 40.12 Thank you for your comment. Please see the revised References Cited section in this final EIS.
- 40.13 The purchase price for water from Flaming Gorge Reservoir is subject to negotiation, according to a report entitled "Alternative Sources of Water for Prototype Oil Shale Development, Colorado and Utah" (USDI, Bureau of Reclamation, 1974).

## Comment Letter 41

## Response Letter 41

February 6, 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
170 S. 500 East  
Vernal, Utah 84078

Dear District Manager:

If we take a careful look at past mistakes, there is plenty of evidence to show that rushing into a project that is relatively un-researched is a potential disaster.

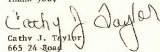
The White River Dam proposal could be an example of this.

41.1 The project has not been researched to the extent needed. There is evidence that the water needed for oil shale development can be obtained through the ground water available now.

This letter is written for the main purpose of requesting a delay in building the Dam on the White River.

We need more research done before the construction is started. If Utah is important, the delay will be made. To go ahead with the Dam now, will not only be detrimental to Utah, it will also be detrimental to the surrounding states.

Thank you,

  
Cathy J. Taylor  
665 24 Road  
Grand Junction, Co. 81501

41.1 See the revised Groundwater section under Water, Chapter 3, and Letter Responses 25.3, 27.16, 27.17, 27.28, 27.29, and 27.35.

## Comment Letter 42

Dorothy Harvey

Utah Water Resources Council  
Box 1713  
Salt Lake City, Utah 84105  
February 5, 1981

Lloyd Ferguson, District Manager  
Vernal District Office  
Bureau of Land Management  
170 S 500 E  
Vernal, Utah 84078

Dear Mr. Ferguson:

I would like to submit this comment as part of the record on the Draft EIS of the White River Dam Project. I am submitting it as my individual comments but as a member of the Utah Water Resources Council and of Citizens For a Responsible GWR organization. Other members of these organizations will be submitting individual opinions covering many of the issues being addressed in this EIS. While these are being submitted as my opinions, there is broad support for some of my recommendations among other Utah and Colorado groups who are interested in the issue of water supply for energy developments in the Upper Colorado River Basin.

First, I would like to state that this Draft EIS is one of the best preparations I have dealt with even though I will recommend alternatives other than those represented. It clearly explains advantages and disadvantages, local and cumulative impacts, socio-economic issues, and costs in an orderly and readily understandable way. It includes well prepared tables and supporting information to justify judgements made. It addresses most of the concerns we have about continued functioning of the natural ecosystems and endangered species habitat in a thorough way. It suggests areas needing additional information and consideration as a means of resolving the problem of water supply for energy development.

However, in view of the following reasons, I recommend that Alternative # 2 in the EIS NO ACTION - be taken by the BLM.

- 42.1 1. A decision based on the five alternative water supply options is premature, in my judgement, since all potential water supply alternatives are either not fully determined or are not yet available.

In spite of the significance of the floodplain/riparian ecosystem of the White and Green Rivers for birds and wildlife and the aquatic habitat for fish which are now endangered, as well as river recreation associated with the entire Colorado River Basin, three major water supply alternatives have not been addressed adequately or at all.

### a. Ground Water

The EIS mentions some information on ground water thought to be held in storage in the Bird's Nest Aquifer (80,000 acre feet) determined by VTR, Colorado, Inc. 1977, and a reasonable amount of water in a lower level aquifer, the Douglas Creek Member of the Green River Formation - both of which water sources are said to present problems for use. The latter source was also determined by VTR, Colorado, Inc. 1977.

2.

42.1  
(cont.)

The EIS suggests that additional studies on ground water supply of the project area would be required to clarify the amount of water available. I suggest that this is a necessary procedure for decision-making.

The U.S.G.S. is completing study on ground water in the Uinta Basin but information will not be available for several months yet. However, in Water Resources of the Northern Uinta Basin Area, Utah and Colorado, with Special Emphasis on Ground-Water Supply" - Hood and Fields, Hydrologists of U.S.G.S., a 1978 study prepared in cooperation with the Utah Department of Natural Resources, Division of Water Rights, pub. #72, I quote some interesting, concluding information:

"Fresh and slightly saline ground water in transient storage in the northern Uinta Basin area amounts to an estimated 28 million acre ft (34,000 hm<sup>3</sup>), the bulk of which is stored in six of the seven major aquifers in the area.... Five major consolidated aquifers -- the Duchesne River, Uinta, and Currant Creek formations, the Glen Canyon (Huger) Sandstone, and the Weber Quartzite--all are relatively undeveloped, and withdrawals from them have not depleted storage. The Weber and Glen Canyon are the most promising for large yields of fresh to slightly saline water.... Despite local water-level declines, withdrawals of ground water have changed the amount in storage little."

"Most of the surface water in the northern Uinta Basin area is contributed by the Duchesne River and 10 major tributaries to the Green and Duchesne Rivers which have their headwaters near mountain drainage divides. Most of the flow is derived from melting of winter snow accumulations.... The estimated gross average annual recharge to the ground-water system is 500,000 acre-ft (620 hm<sup>3</sup>). Of this amount, 200,000 acre-ft (250 hm<sup>3</sup>) returns to streams in upland areas. Most of the recharge is in the uplands and the water then moves to the lowlands mainly in consolidated aquifers. The remainder of the net 300,000 acre-ft (370 hm<sup>3</sup>) of recharge occurs in the lowlands."

"The most productive sources of water for future needs is ground water in glacial outwash and related deposits. The Weber Quartzite and the Glen Canyon Sandstone are the next most promising sources. Although pumping these and the less productive aquifers will affect the discharge of streams in varying degree, the aquifers are alternative sources of water, especially in times of drought."

"Increased efficiency in the use of water could make part of the presently used supply available for additional use...."

While this selection of information simplifies what is a complex ground water circulating system, it nonetheless points out the need and opportunity for an entirely different look at water for industrial development than is presented in the White River Dam EIS. Finding more definitive U.S.G.S. information release, this EIS is premature.

42.1  
(cont.)b. Water Conservation Technologies by Industry, Municipalities, and Irrigators

Although northeast Utah is considered an arid region, where massive industrial development for energy is projected, and where free flowing rivers such as the White and Green play a significant part in the wildlife and recreation of the area, nowhere does one read or hear about utilization of contemporary water conservation technology.

All municipal planning for water use is predicated on the consumption of unlimited quantities of new, high quality stream water or well sources. Known and available water reducing techniques for inside home use and outside lawn use - which can save up to 5 % of home water requirements - are ignored in water planning for Vernal or for proposed new communities.

Assessments by industry of its requirements for oil shale development do not spell out, publicly, what options are available and will be used in individual company development operations which can minimize water need. The one oil shale developer which produces water as a by-product of its operations, Geokinetics, is not funneling its by-product water - into an industrial water pool for re-use. Industries planning oil shale development in northeast Utah appear to be requesting amounts of water for their mining operations individually, with insufficient evidence of concrete water demand for the specifics of their project developments to enable a concerned public to determine real water need. One whole issue of revegetation, a highly consumptive and unpredictable water use in this arid country, is left unquantified. Similarly, quantities of water - as well as quality - required for dust suppression, again, is undefined in individual industrial water quantification.

In an arid region, where competition for available water sources of water by massive new energy projects will be overwhelming for ranchers and irrigators, one should be hearing about applications of the most contemporary water saving technologies to irrigating procedures. Both to reduce irrigation need and waste and to salvage a necessary and important livelihood.

Without obvious efforts to conserve available sources of water on the part of the primary water users, the public placing great significance on the value of public resources for wildlife and recreation sees these resources being sacrificed unnecessarily. It is not a question of either/or .. of total disruption of an irreplaceable warm water river ecosystem for an energy development option. The issue here is one of water management on the part of all water users... and in the most efficient way... by known and applied techniques.\*

\*See Addendum: "Water Conservation Potential for the Nation"

42.1  
(cont.)c. Potential Availability of 136,000 acre feet of Uintah Basin Water Now Planned for the Central Utah Project Transbasin Diversion to the Bonneville Basin

Recent Department of Interior analysis of the CUP Repayment Contract on the Bonneville Unit, CUP, indicates that while the contract appears to cover repayment of an additional \$258,775,000, in actual fact, it covers a total of \$646,937,500. When combined with the existing repayment contract covering \$102,400,000, the total project costs to be repaid by municipal and industrial customers could be as high as \$749,337,500. The public in Utah is as yet uninformed as to how much they will owe the Federal government for their Federally developed water.

W & I water users in the Central Utah Project have been under the misguided impression they will be paying \$60 for their water. The truth is, if this contract is signed, they will be paying, at a minimum, twice as much as the Service has ever charged for W & I water in its history. At a minimum, CUP customers would pay a minimum of \$163.62 per acre-foot per year and the cost could go as high as \$339.11 per acre foot per year.\*

Once the real facts become known about Utah's indebtedness for the Bonneville Unit alone, as well as some legal complications, and that far cheaper State water management alternatives are available and can be developed, it is quite possible that the unnecessary transbasin diversion of 136,000 acre feet of Uintah Basin water will be abandoned. And a very real possibility exists that this 136,000 acre feet of water will flow down the Duchesne River to where it meets the Green just above the junction with the White River.

Since this is a viable possible alternative water supply in this northeast Utah region, it reinforces the fact that a White River Dam is premature. It appears to me that this situation changes the entire framework for planning energy development in Utah.

- 42.2 2. Considering the magnitude of the potential energy development and the significance of the impacts on the human and wildlife resources in the entire White River, Piceance and Uinta Basins, as well as the interrelationships of a key resource in developments in the region - water - there is growing interest and support for an inter-State approach to planning water use and development rather than piece meal, segmented water development approaches in each State.

The IIS repeatedly states that cumulative impacts on the functioning of the natural ecosystem will be far greater than those of any individual water supply project. The sum of the impacts from a White River Dam or other water withdrawals in Utah combined with the Taylor and Vernal Draw and some other proposed water withdrawals in Colorado in the White River alone would ultimately destroy a valuable western alpine and desert river system.

While the White River has long been earmarked as the obvious source of water for Colorado and Utah oil shale development,

\*See Addendum: Schematic Map of Major Water Projects of White River

42.2  
(cont.)

the Piceance Basin is known to contain 77,500 acre feet of ground water - enough to commence Colorado oil shale development without White River water. Completion of the U.S.G.S. Uinta Basin ground water study should provide the necessary information for serious and conscientious planning for quality of life and preservation of significant river resources as oil shale development takes place in Utah.

The realization that the quality of life can be radically changed in western Colorado and for northeast and eastern Utah is provoking the growing interest in public participation in Basin-wide planning of development, growth, and uses of the natural resources associated with the White River.

From this perspective, Utah and Colorado citizens who consider a White River Dam a premature and limited concept and an unwarranted commitment of public resources to development purposes, have proposed that the Corps of Engineers prepare some type comprehensive resource analysis of the entire White River prior to granting any individual 400 dredge and fill Permit. Such an analysis could serve as a basis for planning Basin-wide water use, instream flow preservation, and water development.

From this perspective, Utah and Colorado citizens are proposing consideration of an inter-State compact on rights to the White River water in order to avoid polarization of the water issue and clarify allocation of the supposed 500,000 acre feet present in this entire River annually. Any inter-State agreement should include the presence of the Ute Indians at the bargaining table to insure their claim for water rights to meet Ute and Uray Reservation requirements.

As part of the planning, from this perspective, Utah and Colorado citizens would want to consider water storage from one facility at a high elevation site in Colorado which might serve all separate water users in preference to separate White River dams the length of the River. Such a possibility might not be necessary pending determination of ground water and other alternative supplies.

We reiterate: this entire Basin-wide issue is really one of efficient water management, of changing the way people value and use water. Dependency on use and availability of unlimited quantities of high quality surface (river) water to meet all municipal, industrial, and agricultural needs must give way to adoption of conservation measures as a means of providing for the diversity of public use of their waters. There is room for endangered fish habitat! There is room for riparian floodplains and the enormous bird and wildlife resources which associate with these! There is room for the kayaker, the canoeist, and the river floater! There is room for the economics of recreation associated with the outdoors! There is room for quality of living for Basin residents and others!

## 42.3

3. A glaring omission from this EIS, perhaps due to limited dollars or staff expertise, is an economic evaluation of the fish, wildlife and recreation resources involved in and to be impacted in the process of supplying water for just one energy development option,

42.3  
(cont.)

oil shale. Natural resource economists have developed a "state of the art" economics for "equalizing" values to people for their recreational enjoyment. Several years ago, such a Montana economist, Joseph Horvath, valued a bird watcher's day at \$350. A bird watcher would be willing to pay that amount to be able to see and or identify certain species of birds. This means that the habitat for this species must exist, if the bird he wishes to see is to exist. And it must exist somewhere he can get to in order to spot it. If he lives in Utah, he may not have the money, the time, or the opportunity to seek it out in Arizona. The more specific the habitat, i.e., a riparian floodplain, the greater the value is the habitat. Even so, a warm water river riparian resource produces greater bird diversity than does an alpine riparian resource. And threatened or endangered species have even greater economic value based on their extreme rarity.

As free flowing rivers are converted to flatwater recreation, increasingly, the value of the free flowing river recreation remaining, becomes even greater; the greater productivity of the warm water river riparian system, in its rarity now, exceeds reservoir shoreline wildlife habitat production, which is limited in function due to fluctuating water levels and unstable vegetation opportunities.

Since the EIS omits economic statistics on the value of these resources, the losses of them are not counted as costs of development. Therefore, an economic bias favoring a State of Utah construction of a storage facility for water for industry unduly creates a bias in favor of utilizing that facility in preference to industry bearing costs of pumping or piping water from an alternative water source. The greater natural resource and recreation losses resulting from inundation of 13 miles of river basin habitat is not reflected as a cost for industry in using the storage facility nor as a reduced cost for his piping or pumping.

- 42.4 4. Information presented on recreation uses of the White River is not up to date. Increasing uses of varying portions of the Utah stretch of the White River by canoe, alone, are taking place mostly on weekends throughout the spring, summer and even early fall.

Information on the value of the White River for recreation should incorporate opportunities of the river floater or fisherman to observe wildlife. (A fisherman I talked with greatly valued this River for his recreation fishing.) The presence of the river beaver, a swimming mallard and her young, Canada geese, migrating sandhill cranes, cliff and tree dwelling raptors, active nests on overhanging cliffs of the cliff swallows, a perching Cooper's hawk, other resident and seasonal birds, a doe and her fawn all contribute to the value of the recreation enjoyment on and along the River. This is not clarified in the EIS. No economic value is appraised.

42.5 5. The Question of White River Dam Safety

An August, 1980, report on conditions about the safety of the proposed damsite and reservoir, by Howard Ritzma, Director of the Utah Geologic Survey, and only very recently publicized, raises serious questions about siting in the White River of any large storage facility. This report was in response to a request by P.D.Davis (Survey Notes, June 3, 1976) and was supplied to the Utah Division of Water Resources and Director of Utah Department of Natural Resources, Gordon Harnston.

The burden of this report states that the location of of the proposed damsite offers the "least competent formations" (geologic support) for construction of a large dam. It states that many problems will be encountered in the storage of water coming in contact with the type of bedding planes (fracturing of the geologic structure) in this proposed dam and reservoir siting. Probable loss of water into the bedding planes and ultimate stress conditions raise questions about the potential safety of the proposed water storage facility.

Fuller discussion of this situation appears in the November, 1980 "Survey Notes" as well as in the Ritzma report.

The seriousness of this issue, in combination with the apparent consultation and contracts on the White River project not being subject to the rigorous State bidding process in being granted to Bingham Engineering, adds to the unease a number of Utah residents have that public resource protection is not adequately subject to public scrutiny in the decision making in all proposed developments in the State. Full public discussion of the issue is required by the BLM as a condition of any action taken.

42.6 6. Legal and Administrative Constraints and Obligations of the BLM

As a Federal Agency mandated to manage public lands' resources on a Multiple Use basis, and for purposes of serving a nation's public and its interests, the BLM Agency should be reminded of its legal and administrative constraints. These are attached as an Addendum to this comment.

\*Jay Bingham preceded Dan Lawrence until 1967 as Division head of the Utah Division of Water Resources.

Conclusions and Recommendations

- 42.7 In view of the above stated reasons, I recommend that the BLM deny the State of Utah Rights-of-way across floodplains on Federal lands, as well as other public lands, for purposes of constructing a White River dam and reservoir storage. In the EIS this is Alternative #2 - No Action; No other Alternatives.

In view of the above stated reasons, I recommend that Federal and State Agencies in both Utah and Colorado having jurisdiction or interest in public resources in the White River Basin meet with citizens in both States for purposes of planning use and development of all relevant water resources and their associated functions, and wildlife and recreation values, in the perspective of proposed energy developments affecting this Basin and people's way of life. Active citizen groups should include the newly formed Western Colorado Congress, Grand Junction, Colorado, and any affected Indian Tribe or nation.

Very truly yours,

*Dorothy Harvey*

Dorothy Harvey  
Utah Water Resources Council  
Citizens for a Responsible CUP  
High Uintas Wilderness Coalition  
Colorado River Basin Coalition

Addendum

1. List of pertinent laws
2. Schematic Map of the Major Water Projects of the White River (Colorado and Utah)
3. "Water Conservation Potential for the Nation" - Brent Blackwelder, Environmental Policy Institute, 317 Pennsylvania Ave., S.E. Washington, D.C. 20003 (December 1978)

**42.1** a. See the revised Groundwater section in Chapters 2 and 3 of this Final EIS. The question of groundwater availability and quality are further discussed in Letter Responses 25.3, 27.16, 27.17, 27.28, 27.29, and 27.35. With available data, it seems that either the water is too caustic or saline for industrial use or the transmissibility is too low, requiring a large number of widely spaced wells.

b. Within the Upper Colorado River Basin itself, municipal uses are projected to account for less than 2 percent of future depletions. Any reductions in consumption by improving the efficiency of local municipal use would be relatively insignificant. The export of water outside the Upper Colorado Basin (i.e., Central Utah Project furnishing water to Wasatch Front), will account for one of the largest depletions of water from this area. See the revised Chapter 1, Purpose and Need section, of this Final EIS for more information about industrial water needs from the White River.

The amount of water exported to urban areas within the Upper Colorado River Basin could be reduced by as much as 300,000 acre-feet per year by conservation and use efficiency. However, the White River Basin in Colorado and Utah is not the source of these projected exports.

Improving the efficiency of irrigation could reduce water use by as much as 0.5 million acre-feet per year. However, it has been estimated that reducing irrigation depletions by 130,000 acre-feet per year would cost \$700 million. This is about \$5,000 per acre-foot (Colorado Department of Natural Resources, 1979).

c. It is possible, but not probable, that all projected exports of water from the Upper Colorado River Basin could be retained in the Basin and used for energy development. This could reduce the need for dams and groundwater development.

These alternatives, however, are not within the scope of this EIS nor are state water rights the prerogative of the Bureau of Land Management. The agreements have been completed regarding the Central Utah Project and are not subject to renegotiation at the present time (Colorado Department of Natural Resources, 1979).

**42.2** The need for an interstate compact on allocation and diversion of White River water is recognized by others. Some discussions between Colorado and Utah have been held regarding use of the White River. However, there is no agreement, and Utah proposes to use some of the water for processing oil shale. This proposal does not evaluate in any detail the magnitude of potential impacts upstream. Also, see Oral Testimony Response 6 and Letter Responses 16.1 and 37.3.

**42.3** There is little consensus among economists regarding assignment of dollar values to recreational experiences and natural environments. Rather than assign economic values through a controversial methodology, the EIS narrative explains the nature of the resources. See the revised Recreation sections of Chapters 3 and 4 in this Final EIS.

**42.4** It is recognized that the recreational use and value of the White River has increased during the past decade (see Oral Testimony Responses 20 and 32). It is also true that wildlife present along and in the river contribute to its value as a recreational resource. However, the lack of

**42.4** available data precludes meaningful appraisal of the economic value of recreational resources and their uses. See the revised Recreation sections of Chapters 3 and 4 in this Final EIS.

**42.5** See Letter Responses 15.2 and 25.13.

**42.6** The views expressed will be considered in the decision-making process.

**42.7** The views expressed will be considered in the decision-making process. Interstate agreements (Utah and Colorado) concerning resources of the White River may be pursued by the responsible agencies.

## Comment Letter 43

February 5, 1981

District Engineer, RMW  
Vernal District  
170 South 500 East  
Vernal, UT 84078

Dear Sirs:

43.1 Because Executive Order 11990 directs Federal agencies to minimize damage to wetlands and to preserve and enhance them we ask you to select Alternative 2 for the White River. It is the only alternative which will really protect the White River riparian lands. We urge you very strongly to preserve the seasonal flow of the White River as that is so very important to the environmental health of the river.

We strongly urge that you forget alternative 1 as that alternative is contrary to the intent and the wording of Executive Order 11990 and would destroy a priceless river and its riparian community.

Yours truly, *Edith W. Thorniley*

Mr. & Mrs. P Poland, Mr. & Mrs. I Barwood, Ms. D Farman, Mrs. W Annet, Mr. & Mrs. C Wilkins,  
Mr. & Mrs. T Colette, Mr. & Mrs. T Szabo, Ms. N Lubri, Mr. & Mrs. A Morency, Mr. & Mrs. E Park.

Edith W Thorniley  
18453 Schoenberg  
Detroit, MI 48205

## Response Letter 43

43.1 The views expressed will be considered in the decision-making process.

JAN 30, 1981

DESKET MINNEAPOLIS  
VARNAL COUNTRY BLVD  
170 SO 560 EAST  
VARNAL, UTAH 84678

DEAR SIR:

PERHAPS SOMEWHERE DEEP IN THE LEADING REAR OF AN AROUND THE CONSCIENCE OF OUR POPULACE WILL BE CHANGING. AND POSSESSING GREATER INTELLIGENCE, REFLECTION AND A RESPECT FOR THINGS OTHER THAN THE AUTHORITY DOLLAR, WE WILL REALIZE THAT THE ALLEGATIONS OF OUR NATIONAL ENVIRONMENT WITH PROJECTS SUCH AS THE PROPOSED WHITE ROCK DAM IS NOT THE ANSWER NOR A JUSTIFICATION FOR PROVIDING TO A MINDLESS AND MATERIALISTICLY ORIENTED SECURITY ADDITIONAL PERKS OF COMFORT AND ENTERTAINMENT WHICH FURTHER THE FALSE SENSE OF SECURITY UPON WHICH OUR EXTERNAL HAPPINESS IS BASED.

44.1 ONE CAN WRITE ENDLESSLY ON THE LACK OF SUBSTANTIALIZED RATIONAL INFORMATION IN THE DRAFT EIS AND THE MISCONCEPTIONS WHICH ARE BEING FOSTERED BY THE DAM'S PROponents, BUT I FIND IT QUITE ENOUGH TO BASE MY OBJECTION TO THIS PROJECT ON THE IMMORALITY OF THE STATE TO BORROW \$1,000,000 TO DESIGN THE NAUVOO CHURCH 60 MAMMALS AND MORE THAN 1000 SQUARES OF BUILT IN ADDITION TO THE VARIOUS PERKS OF RECREATIONAL OPPORTUNITIES WHICH ARE PROVIDED BY THE DAM AND ITS ENVIRONS.

HOW CAN WE CONTINUE TO JUSTIFY BELIEFS IN OUR SHORTHANDY OVER OTHER RENTS OF LIFE ON THIS PLANET AND INVENT NEW WAYS OF FURTHERING OUR INSATIABLE GREED? AND UTAH, WHOSE COUNCIL IS AN EMBARRASSMENT TO THE REST OF THE NATION, SHOULD DISCARD A LEADER IN ENVIRONMENTALLY SAFE ALTERNATIVE FORMS OF ENERGY RATHER THAN BLEEDING AN ALREADY OVER-LOADED AND ENVIRONMENTALLY AND ECONOMICALLY UNSTABLE SOURCE.

44.2

IT MUST BE MY ABILITY TO PROVIDE A NEW PLANET WHILE OUR LAND IS NOT BE ABLE TO PROVIDE IN OUR REAR AND THAT I AM ALIVE TO THE FUTURE NOT AND BE INTERESTED OF OTHER PROPOSALS CONCERNING WITH THE WHITE ROCK.

Sincerely,

115 COUNCIL COUNCIL  
170 SO 560 EAST  
VARNAL, UTAH 84678

## Response Letter 44

44.1 The views expressed will be considered in the decision-making process.

44.2 The views expressed are included in this Final EIS and will be considered in the decision-making process.

## Comment Letter 45

561 Fairview Avenue  
Salt Lake City, Utah 84105  
February 6, 1981

District Manager  
Vernal District of Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

re: white river Dam  
Public Comments

Dear Sir:

I am writing to urge you to adopt Alternative Two, as cited in the Draft Environmental Impact Statement on the white river Dam project. Before a decision is taken to build any specific dam, fuller study and demonstration of at least the following topics/ issues is required: need, costs and benefits, interstate planning, and geological safety and desirability.

- 45.1 1. Need: Oil shale technology is still in its infancy, and already the need for this project is being questioned. It seems premature to build a dam now which may not be needed (and, in fact may be counterproductive), as oil shale technologies advance.
- 45.2 2. Costs and Benefits: Benefits of the project in relation to costs (societal and environmental as well economic), appear questionable. As proposed, the reservoir would have a very limited useful lifetime due to high sedimentation, hydroelectric production would be comparatively inefficient, and economic and other losses resulting from the loss of riparian wetlands and aquatic habitat could be deer and widespread.
- 45.3 3. Interstate Planning: Until interstate agreements and ground water studies of basins in both Utah and Colorado are completed, it seems unwise to commit ourselves to any specific dam development on the white River. Over-all, comprehensive river planning is needed.
- 45.4 4. Geological Safety and Desirability: Utah Geological Survey findings that the proposed dam would be located in a seismologically risky region and that seepage from the reservoir could infiltrate oil shale deposits point to the need for such more thorough study of geological factors.
- 45.5 In conclusion, a great deal of compelling evidence and important planning considerations point to the need to delay this project until further planning and study are completed and can demonstrate that the project is indeed necessary and desirable from a variety of perspectives.

Sincerely,

*Sara Muhl*  
Sara Muhl

## Response Letter 45

- 45.1 See the revised Chapter 1, Purpose and Need section, of this Final EIS for new information. See Letter Response 47.1 for information on oil shale technology.
- 45.2 The views expressed will be considered in the decision-making process.
- 45.3 Thank you for your comments concerning the need for interstate river planning. Your views have also been expressed by others. See Letter Response 42.2 and Oral Testimony Response 5 about interstate river planning. For information about groundwater studies, see Letter Responses 25.3 and 27.16.
- 45.4 The strongest documented earthquake near the project area occurred on October 11, 1960 approximately 145 miles southeast of the dam site and measured 5.5 on the Richter scale. Other seismic event epicenters of less magnitude occurred on February 15, 1967, 15 miles to the northeast of the dam site, and on April 21, 1970, 10 miles east of the aforementioned location. However, no active faults have been found in the project area, and the nearest inactive fault is several miles from the site (Bingham Engineering, 1981a). See the revised Geology section of Chapter 3 and Appendix 12 of this Final EIS. Also see Letter Response 27.37 for information on reservoir seepage.
- 45.5 Additional studies have been completed and new information is contained in this Final EIS. See the revised Chapter 1, Purpose and Need section.

## Comment Letter 46

Feb. 7, 1981

District Manager  
Vernal District  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Dear Sir,

As a concerned citizen who sees the American Southwest shrinking rapidly under the impacts of mineral exploration, stripmining and dam building I would like to extend the following comments on the Draft Environmental Impact Statement for the White River Dam Project.

- 46.1 The White River is one of the few remaining undammed major water courses in the southwest. The proposed thirteen and one-half mile reservoir would destroy valuable Colorado Squawfish habitat and important recreation canoe waters.
- 46.2 Justification for the dam seems sketchy. If, as the BLM contends, the white River Dam is necessary for support of future oil shale development why hasn't The U.S. Water and Power Resources Service seen this pressing need and proposed the project? Since when is the BLM mandated as a dam builder? I question the need for building a dam to expedite oil shale development when actual mine production, if in fact it is needed or environmentally plausible is still years in the future. The white River carries considerable sediment and building a reservoir before actual water needs are formalized would only cause excess siltation behind the dam.
- 46.3 For the above reasons I strongly object to the selection of Alternative one and implore the BLM to honor the directive of Executive Order 11990 to "...take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities..."
- I request that Alternative two be selected as the preferred alternative and ask the BLM to serve the best interests of the American people by doing all it can to protect one of the prime riparian wetlands remaining in the southwest. Thank you for this opportunity to comment on the Draft Environmental Impact Statement.

Sincerely,

*Michael Burwell*  
Michael Burwell  
P.O. Box 40967  
Tucson, Arizona 85717

## Response Letter 46

46.1 Your comments are correct and will be considered in the decision-making process. See Appendices 4 and 10 for additional information on Colorado squawfish and the revised Recreation section of Chapter 4 in this Final EIS.

46.2 Thank you for your comments on the proposed White River Dam Project. It should be noted that the U.S. Bureau of Reclamation (formerly named the U.S. Water and Power Resources Services) published a report (September 1974) entitled "Alternate Sources of Water for Prototype Oil Shale Development Colorado and Utah." This report provided information concerning several dam sites and associated reservoirs in the White River drainage which could store and provide water for prototype oil shale development.

The proponent of the project is the Utah Division of Water Resources, not the BLM. Because public lands and resources administered by BLM are within the White River Dam project area, it was determined that an EIS should be developed. BLM was designated the lead agency in the preparation of this EIS.

46.3 The views expressed will be considered in the decision-making process.

## Comment Letter 47

2-3-81

District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, Ut 84078

Dear District Manager:

I wish to express my opposition to the proposed White River Dam Project for the following reasons:

- 47.1
- a) Oil shale technology is not far enough advanced
  - b) Water needs for oil shale development have not been determined.
  - c) A master plan for the White River has not been developed.

## Response Letter 47

47.1  
(cont.)

- d) Alternative dam sites have not been investigated.
- e) The project would destroy considerable wildlife populations + habitat.
- f) Unique recreational values would be lost.
- g) Since there are no current plans for oil shale development, the dam might be filled with silt before it was needed, defeating its purpose.

I believe these reasons are good cause for adopting Alternative 2: No Action.

Sincerely,  
Jack Greene

47.1 Within the last several years various companies have, with financial grants from the Department of Energy, been researching the feasibility of oil shale development. In addition to this, many companies on their own are now making firm plans for commercial operations. Many oil shale companies have plans to develop operations in the Uinta Basin. Oil shale development and water development should occur at the same time.

For information about oil shale development water needs, please see the revised Chapter 1, Purpose and Need section, in this Final EIS.

For information on a master plan for the White River, see Letter Responses 37.3, 42.2, and Oral testimony Response 6.

Concerning investigation on alternate dam sites, refer to Letter Response 25.2 and see the new Figure 2-2 in this Final EIS.

It is true that certain wildlife populations (i.e., beaver, deer, and others) would decline and habitat would be lost as discussed in Chapter 4, Environmental Consequences section. However, there are trade-offs. See Letter Response 5.10.

As noted in the Recreation portion of Chapter 4, Environmental Consequences section, there would be significant impacts to recreation resource values in the inundated area and, to a lesser degree, downstream from the proposed dam. Proposed mitigation would partially compensate for values lost.

2-16-81

Dear reviewers,

48.1

I think the draft EIS on the White River Dam is flawed by a logical inconsistency and ought to be revised.

The statement spells out the considerable ecological destruction of building a dam, with elimination of 13.5 miles of rare streamside habitat and the inundation or dewatering of one of the most interesting canoeing streams in Utah. It notes that the water could be delivered by one of several ~~alternatives~~ alternatives, such as pumping water by pipeline from the Green River. Obviously, this alternative would cause much less severe environmental impacts.

But then the statement says the BLM intends to approve the dam, unless some insurmountable problem shows up with endangered species.

The statement does ~~not~~ not justify such a conclusion. The only advantage I have been able to find in it of a dam ~~is~~ over a pipeline is financial. But the environmental and aesthetic disadvantages of a dam are legion.

48.2

The statement should ~~also~~ refine the financial analysis.

To simply compare one dollar ~~of~~ amount against another would be ~~adequate~~ adequate, if equal ~~benefits~~ benefits could be obtained at a cost of equal environmental impacts.

But in these alternatives, the impacts are far different. So the unbiased decision maker is forced ~~to~~ to make more subtle comparisons than dollar costs. He is required to weigh ~~the~~ competing values --

2.

48.2  
(cont.)

such as man's ~~love~~ love of beauty ~~and~~ and a desire not to outrage nature more than necessary -- against dollar costs.

48.3

The statement should delve more deeply into the kind of information needed to reach an intelligent decision about alternatives. For example, it should try ~~to~~ somewhat to ~~discover~~ discover whether oil shale is actually going to be developed.

Oil shale does not seem like a certain bet. The cost of digging vast underground retorts or excavating thousands of tons of rock, then pulverizing the shale, then heating it, and then recovering energy, ~~is~~ is enormous. It does not compare well with the cost of digging coal from the ground and having a useful energy source immediately, and I think a liquid ~~fuel~~ fuel could more profitably ~~be~~ be derived from coal.

I was told by a University of Utah chemical engineering expert that shale oil is not a high-quality fuel. It might make a good diesel fuel, but because of impurities in the product, it may not be valuable as ~~gasoline~~ gasoline. So the market may not be there for shale oil, even if the gigantic costs of extracting it are met. Also, if the industry were a sure bet, I believe the big oil companies would have put it into large-scale production long ago.

For the state to finance a dam-building project for an industry that may not materialize would be a gross gamble, a waste of taxpayers' money.

So there is that financial consideration: who can better

3.

48.3  
(cont.)

afford to invest in an ~~an~~ uncertain energy technology, the state or the big oil companies? It makes ~~no~~ sense for Utah taxpayers to underwrite the risks of any company, whether Phillips Petroleum or Magic Circle. The financial risks involved should only be assumed by the direct beneficiaries of the project.

The taxpayer will be stuck with the bill if oil shale does not come in. Fiscal reports of major oil companies should be examined to see if the ~~same~~ companies are so poor that they can't afford to build dams. ~~The~~ The profits of some have been astronomical in ~~the~~ recent years. But the average Utahn is barely keeping up with inflation.

It is asking too much for the residents of this state to be expected to sacrifice forever a wonderfully natural river gorge -- with its cottonwood groves, grasslands, giant beaver holes in the mud banks, rugged cliffs, fast little rapids and abundant wildlife -- and to pay for ~~this~~ this ~~destruction~~ destruction too!

48.4

To make sense of the pros and cons, the statement should study the alternatives in terms of cost per barrel of oil over the pipeline's ~~life~~ time. For the sake of this discussion alone, it could be assumed that oil shale will be developed.

That kind of study would put things in much ~~clearer~~ <sup>better</sup> perspective for ~~the~~ the decision-maker.

I can't vouch for his figures, but Peter Hovlindh has gone through such an exercise. He says the difference between the least and

48.4  
(cont.)

most expensive construction alternative is only 6¢ per barrel of oil.

With OPEC setting a price of \$32 a barrel, which will no doubt increase considerably by the time the project is built, a pipeline is well worth the ~~cost~~ <sup>extra</sup> cost. \$32.06 is not enough of an increase over \$32 to justify the sacrifice of the White River.

Oil consumers must be willing to pay the cost of protecting the environment, just as ~~power~~ <sup>other</sup> consumers must pay the extra cost of generation required by ~~air~~ <sup>installing</sup> air-pollution controls in power plants. It is a ~~of~~ necessary cost of doing business. Call it an environmental tax.

Surely most people who buy gasoline would be willing to ~~pay~~ pay their portion of the 6¢-per-barrel increase.

48.5

The practicality of a pipeline from the Green River is already ~~being~~ demonstrated by the fact ~~that~~ that Moon Lake Power Plant intends to get its water from just that, rather than the nearby reservoir to be created by the White River Dam. If Moon Lake can do it, the oil companies can too.

The EIS should be rewritten, focusing on the pipeline as the preferred alternative. Financial ~~calculations~~ <sup>on dam</sup> suggested in this letter should be carried out fully. The actual cost of ~~the~~ project goes a lot deeper than a flat dollar figure.

Thank you.

*Joseph Bauman*  
Joseph Bauman

909 S. 20th East

Salt Lake City

Utah 84108

## Response Letter 48

48.1 The EIS provides only a portion of the information to be used by decision-makers regarding the proposed dam and reservoir. The agency-preferred alternative in this EIS represents a tentative BLM position as a public disclosure item. This position is not solely based on the EIS information; therefore, it does not necessarily follow that a project with environmental impacts is denied BLM right-of-way authorizations. In making the official decision, many trade-offs will be considered.

The views expressed will be considered in the decision-making process. This Final EIS contains new information obtained from research conducted since publication of the Draft EIS.

48.2 At this point, the financial analyses cannot be refined because detailed information is not available. However, even if costs could be presented, it would represent only one factor that would have to be considered. The decision-maker would still have to compare dollar costs to policies, agency responsibilities, legal considerations, environmental values, etc.

48.3 The scope and purpose of an EIS is specifically defined in the CEQ regulations. These regulations state that, "...An environmental impact statement is more than a disclosure document. It shall be used by Federal officials in conjunction with other relevant material to plan actions and make decisions...." and "...Environmental Impact Statements shall be analytic rather than encyclopedic." Therefore, to "dive deeply" into all related subjects would be contrary to the letter and intent of these regulations. See the revised Chapter 1, Purpose and Need section, of this Final EIS. Also, see Oral Testimony Response 12 and Letter Responses 15.5, 47.1 and 56.9.

48.4 The Draft EIS (pages 43 and 44) contained a very rough estimate of water costs per barrel of oil, based on the assumption of 100,000 bpd production. This was included to give some perspective. There was no intent to intensively study the natural or worldwide oil markets to the extent necessary to predict the cost per barrel of oil over the project's lifetime. The rough estimate contained in the Draft and in this Final EIS provides a gross comparison without the many complexities encountered in an exhaustive cost/process study.

48.5 These views were considered in the preparation of this Final EIS. Information on the pipeline alternatives was analyzed and this analysis is presented for use by decision-makers. The agency-preferred alternative in this Final EIS is presented to reflect the tentative BLM management position at this time. An official decision will not be made until at least 30 days after the filing of this Final EIS with the Environmental Protection Agency. Comments on this Final EIS, including those on the agency-preferred alternative, will be taken into account if received during this 30-day period.

Please see Letter Response 48.4 regarding suggested financial calculations.

## Comment Letter 49



### United States Department of the Interior

#### BUREAU OF INDIAN AFFAIRS

UINTAH AND OURAY AGENCY

Fort Duchesne, Utah 81026

(801) 722-2406 Ext. #260

IN REPLY REFER TO:  
Land Operations

February 6, 1981

#### MEMORANDUM

TO: Bureau of Land Management, Vernal District Office  
Attention: Lloyd Ferguson, District Manager

FROM: Superintendent, Uintah and Ouray Agency

SUBJECT: Comments on DEIS of the White River Dam Project

The Bureau of Indian Affairs is very much interested in any development which may occur on the White River and we appreciate the opportunity to review the Draft Environmental Impact Statement of the White River Dam Project and provide input concerning the document.

Basically we concur with the findings in the Draft; however, we offer the following suggestions which we feel should receive additional attention:

- 49.1 A. Page 4 of the "Unresolved Issues." The Ute Indian Tribe Claims a Winters Doctrine Right for approximately 66,297 Ac. Ft. of water from the White River to irrigate 13,812 Ac. of land along the White River. This right is paramount to all other rights on the White River and may be exercised at any time by the Ute Indian Tribe. For several months the Ute Tribe and the State of Utah have been involved in negotiations to quantify these rights. Agreement has been reached in part by the State and the Tribe on a diversion of 61,598 Ac. Ft. and a depletion of 30,799 Ac. Ft.
- 49.2 B. Because of the complexity of the water rights in the White River it would appear that some agreement should be reached between Colorado and Utah as to their entitlements before either commences a program to utilize waters from the White River. Without an agreement the Project could be tied up in costly litigation.
- 49.3 C. We do not concur with Mr. McKee's conclusion stated on page 5, "Irrigation of Ute lands may not be economically feasible." This appears to be one man's opinion as to the feasibility of irrigating lands along the White River. We would be interested to see the data from which Mr. McKee's conclusion was drawn. It appears the DEIS singles out the Ute Tribe's farming program as being uneconomical without knowing the full details of what the Ute Tribe has in mind. The Ute Tribe is in the process of analyzing several alternatives before making a decision on

49.3 (cont.) using the water from the White River. Based upon this analysis the Ute Tribe will develop an integrated program including agriculture, and M&W use of their share of the White River water.

49.4 D. Since approximately 118 Ac. of Indian land will be inundated or impacted by the proposed White River Dam Project, there is a need to analyze what impact this may have on the Ute Indian people. The Tribe and State will need to reach an agreement for mitigating this impact.

49.5 E. There is a need to further analyze Alternative IV. It appears the potential for developing power exists through this alternative if the intake from the Green River was located higher on the Green River. If this possibility exists part of the cost per Ac. Ft. could be offset by power generation.

49.6 F. Both the Ute Tribe and B.I.A. are concerned about the proposed 250 cfs release from the dam. It appears these releases are necessary to meet the demands for power generation, instream flow to maintain fish habitat and to supply the Indian requirements. However, our concern is in regard to water needed for instream flows. At the present time this requirement has not been quantified and will not be until the Fish and Wildlife Service completes its studies. We wish to go on record in stating that any requirement for instream flow above the 30,799 Ac. Ft. demand by the Ute Tribe must be supplied from sources other than the Ute Tribe's entitlement. This would require additional water to meet the instream flow demands below the Ute Tribe's point of diversion.

49.7 G. Due to rapid sedimentation of the White River Reservoir there is a question as to whether the White River Dam is a viable alternative to developing waters of the White River? After 52 years the reservoir will not meet the 39,000 Ac. Ft. storage needs. At that time a supplemental supply will need to be developed to meet those demands. It would appear that the sponsoring agencies should investigate alternatives to extend the life expectancy of the reservoir over the projected 82 years. Without such alternatives the Reservoir will be of little or no value to anyone and could create a serious management problem due to a lack of revenue to support maintenance cost.

49.8 H. Perhaps the most serious question concerning the White River Dam Project is the Socio-economic impact on the surrounding communities. We realize the impact of the Dam Project itself may not be significant; however, the availability of water from the Project will make possible development of Tract UA & UB, Tosco, and Paraho Corporation Oil Shale leases and the Moon-lake coal fired power plant. The cumulative effect of full development of these resources will have a serious impact of the existing life style of the surrounding communities.

Both the Indian and non-Indian communities will experience this impact and will need to plan programs to offset any adverse effects. There will be severe stress placed upon housing, schools, sanitation facilities, utilities, roads, health facilities and police protection, all of which need

49.8 (cont.) planning and funding. The full impact should be assessed and coordinated approach taken by all parties concerned to insure the orderly development of the resources with a minimum of adverse impacts on the surrounding human population.

49.9 I. The DEIS is deficient in a balanced mitigation program for losses which will occur under the Project. We realize the mitigation plan can not be completed due to a lack of data, however, before the program is finalized a mitigation package should be developed and approved by all parties concerned. The loss of 995 acres of riparian habitat downstream will have long term effects on all wildlife population in this semi-arid ecosystem. Based upon the results of the U.S. Fish and Wildlife Studies a mitigation plan may need to be developed for the survival of the four endangered fish species. Due to the increased cost of the Project through inflation the study on the endangered species should be expedited as quickly as possible in order to determine the impacts at the earliest possible date. This would allow for preparation of a mitigation plan, if necessary, and allow for construction in accordance with the proposed time schedule.

*L. W. Collier*  
L. W. Collier

## Response Letter 49

- 49.1 At this point in time, the Ute Indian Tribe and Utah State water use agreement is unresolved. We recognize that negotiations are going on and probably will result in some agreement on diversion and depletion of the White River. For more information, see the revised Unresolved Issues section in the Summary of this Final EIS and Letter Response 37.3.
- 49.2 The complexity of the White River water rights is recognized in this EIS. We concur that interstate compacts and agreements would simplify the situation between Utah and Colorado water users. However, the State of Utah has indicated there is an immediate need to provide water for oil shale developments and is pursuing the dam and reservoir development. Also, see Oral Testimony Response 6 and Letter Response 42.2.
- 49.3 As your comment states, the conclusions reached are the opinions of McKee and Morgan (1978), and this has been indicated in the text. The complete source description may be found in this EIS, References Cited in Text. Chapter 1, Purpose and Need section, in this Final EIS states that the Ute Tribe is currently analyzing alternatives toward development of an integrated program of White River water usage.
- 49.4 Indian lands proposed for inundation are not now in production, although the tribe holds water rights to these parcels (USDI, Bureau of Indian Affairs, 1981). The Utah Division of Water Resources has identified an official negotiating committee for the purposes of mitigating impacts to the tribal lands affected by the project.
- 49.5 Relocating the proposed alternative pipeline intake from the Green River upstream from Walker Hollow would not be feasible. Because of the slight grade of the river, the intake would have to be relocated several miles upstream, perhaps as far as Dinosaur National Monument, where it would be prohibited. Increased expenses for additional pipe, changes in right-of-way and point of diversion, etc., would negate the benefits from the small amount of power which could be generated by piping water such a long distance.
- 49.6 See Oral Testimony Response 10. Appendix 3 of this Final EIS discusses water releases for downstream uses. The agreement between the Utah Division of Water Resources and the Ute Indian Tribe would allocate and provide for delivery of water at a diversion point within the Ute Indian Reservation. The quantity of water that could be diverted from the river is dependent on the natural river flows, as indicated from the past 50-year average flow records. The minimum flow could be met should the past 50 years be indicative of flows for the next 50 years. However, flow guarantees would relate to project releases and water uses and would not necessarily augment natural low flows solely for instream benefits.
- 49.7 As noted in your comment, sedimentation would cause the reservoir to begin storing less than 39,000 acre-feet after 52 years. See the revised Proposed Reservoir section, Anticipated Impacts, in Chapter 4. This analysis assumed a "worst-case" situation. Any upstream dam or depletion on the White River would substantially reduce sediment load and lengthen reservoir life. The uncertainty of future development(s) prevents a more

49.7 accurate estimation of reservoir life. Your comments concerning evaluation of other alternatives will be considered in the decision-making process.

49.8 The EIS has addressed the cumulative employment impact of related projects in the region. However, because of the small expected work force, the detailed estimates of population, settlement patterns, and infrastructural needs are speculative at this time. Planning responsibility for accommodating the work force would be with the State and local governments.

49.9 Included in the official FWS Biological Opinion is a plan for the dam operation and conservation measures designed to aid in the survival and recovery of the Colorado squawfish. If the dam operation and conservation measures were implemented as described in the Biological Opinion, the FWS concludes that the White River Dam Project would not likely jeopardize the continued existence of the endangered fishes. See Appendix 4.

## Comment Letter 50

### HOUSE OF REPRESENTATIVES STATE OF UTAH

316 STATE CAPITOL - SALT LAKE CITY 84114



February 9, 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Dear Public Land Manager:

- 50.1 We the undersigned would like to express some concern about the White River Project. Please include this letter in the Final Environmental Impact Statement on the White River Dam and Reservoir Project.

Our primary concern is that we do not think that the State should be involved in providing water for the oil shale companies. This should be a free enterprise undertaking. The oil companies are in better financial condition than the State. If the oil companies build the water system, this would save the State from assuming any costs and risk in the oil shale venture. Oil shale development is highly speculative. The State cannot afford to venture into speculative investments.

- 50.2 We note that the difference in the least expensive alternative (the State's White River Dam) and the most costly alternative (a pipeline from the Green River) is \$0.06 (six cents) on a barrel of oil. We also note that the destruction to wildlife and recreation is very extensive in the State's proposal and almost trivial in the Green River pipeline proposal. We feel that six cents on a barrel of oil is not too much for the oil companies to pay in the preservation of the White River's abundant wildlife and potentially great recreation opportunities.

Utah has very limited resources to finance and maintain wildlife and recreational opportunities. The State's White River Dam proposal would require more general revenue to maintain both the recreational facilities and to provide foreign fish (bass and trout) for the reservoir. The Green River pipeline alternative would allow the present fishing, deer hunting, beaver trapping and canoeing to occur. The State obtains funds from these present recreations without expending any revenue.

We generally favor any pipeline that the oil companies would build. However, we do recommend some coherent plan of operation involving all the different developments of oil shale. We would like to review such a plan.

*Jeff Fox*  
JEFF FOX  
State Representative

*James F. Conditine*  
JAMES F. CONDITINE  
State Representative

*Arthur L. Kimball*  
ARTHUR L. KIMBALL  
State Senator

*Jo Brandt*  
JO BRANDT  
State Representative

*Terry L. Williams*  
TERRY L. WILLIAMS  
State Representative

*Charles E. Bennett*  
CHARLES E. BENNETT  
State Senator

*Frances Farley*  
FRANCES FARLEY  
State Senator

50.1 Your concerns are noted in this Final EIS, and your opinions will be considered in the decision-making process. Regarding risks and speculation in the oil shale venture, see Letter Responses 15.5, 47.1, and Comment Letter 17.

50.2 It is recognized that water costs would constitute a small percentage of the capitalized cost of a 50,000 bpd oil shale plant. And, as you state, there would be impacts to wildlife and recreation in the project area if the White River Dam were constructed. However, if the oil shale projects were realized, due in part to an economic, reliable water source, the State and local governments would realize millions of dollars in increased tax revenues. It is anticipated that part of these revenues would support State wildlife and recreation programs. See the revised Chapter 1, Purpose and Need section, in this Final EIS.

## THE LEAGUE OF WOMEN VOTERS OF UTAH

211 East Third South, Rm. 200  
Salt Lake City, Utah 84111  
Phone: 328-4532

January 9, 1981

District Manager  
Vernal District of the Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Dear Sir:

The League of Women Voters of Utah is pleased to comment on the draft Environmental Impact Statement on the White River Dam.

- 51.1 We prefer Alternative II, no action until further studies of the environmental impact are complete. The White River should be studied as a river basin system in Colorado and Utah before plans in Colorado and Utah are finalized.
- 51.2 We have recently become aware of two studies done by the Utah State Geological Survey by D. Davis Fitzhugh (1976) and H. Ritzma (1980) which raise serious questions about the geologic problems with the dam site and proposed oil shale mining. These issues need to be thoroughly discussed in the Impact Statement.

Thank you again for this opportunity to comment.

Sincerely yours,

Alice Griffith, President

AG:egg

*Alice Griffith*

## Response Letter 51

51.1 The views expressed will be considered in the decision-making process. See Letter Responses 32.1, 42.2, and Oral Testimony Response 6.

51.2 See Letter Responses 15.2, 25.13, 27.37, and Appendix 12.

## Comment Letter 52

District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84408

Dear Mr. Middleton:

I appreciate this opportunity to comment on the draft environmental impact statement on the White River Dam project. At the onset, I have reviewed the document and strongly support Alternative 2 (No Action) until such time as both federal (i.e. the Bureau of Land Management and the Fish and Wildlife Service) and state (Utah Division of Water Resources and Utah Wildlife Resources) agencies adequately respond to a number of substantive issues. I wish to comment on a number of issues that are of concern.

52.1

Neither the draft EIS nor the state agencies involved have adequately addressed the issue of justification - economic or otherwise. Spokesmen for the Utah Division of Water Resources have argued that the White River Dam is absolutely necessary for oil shale development in eastern Utah. That has not been demonstrated. What is fact, the draft EIS suggests several alternatives to the massive inundation of water along the White River. Since the state, not the federal Water and Power Resources Service, is building the earth-filled dam, state agencies seem to feel that an adequate economic cost-benefit analysis is unnecessary. However, the fact is that the White

52.1  
(cont.)

River Dam project will cost Utahns tens of millions of dollars; in part to subsidize the economically dubious White River Shale Project consortium (which consist of Phillips Petroleum Company, Suncor Energy Development Company, and White River Shale Corporation), and in part to replace Ute Indian water "borrowed" for the Central Utah Project. In the latter case, the cost of that portion of water allocated to the Ute tribe should, in all honesty, be publically declared a part of the rising cost of the Central Utah Project. Even without the additional cost of "hidden" subsidies, the fiscal cost of the Central Utah Project has become excessively burdensome. In the case of the White River Shale Project, the citizens of the state of Utah are being asked to subsidize, upwards of \$18 million, in order to provide water for an industry that has yet to be demonstrate economically viable, and, in addition, holds the promise of massive alterations of the environment of eastern Utah and western Colorado. The highly tenuous economic foundation of the synfuel industry is particularly true in light of the new Reagan administration's attitude towards governmental funding of synfuel consortiums. Are the citizens of the state of Utah being asked to subsidize another Chrysler, I think so.

## 52.2

"The draft EIS explicitly states that "...the loss of the White River ecosystem is a significant ecological loss that has considerable scientific as well as aesthetic value". As pointed out in the draft EIS, the Yampa and the White Rivers are the last free-flowing tributaries in the Upper Colorado Drainage.

52.2  
(cont.)

Plans are now underway to impound water on the Yampa River at two locations (the so-called Juniper-Cross Mountain Project). Thus, the White River may well become the last unregulated tributary in the entire Colorado drainage. In conjunction with a number of other water projects, the White River Dam will impact the habitat of several threatened and endangered fish species in the upper Colorado River drainage, will create water depletions and alter the floodplain of both the Green and the Colorado Rivers, and have an incalculable effect on the salinity in the lower Colorado. Each and every increment in water depletion and change in warm water habitat has a basin-wide cumulative effect. Before any or all water projects are allowed to proceed (i.e. projects on the Yampa, the White, and the Dolores Rivers) it is imperative that a comprehensive Colorado Basin-wide EIS be completed. Unfortunately, the draft EIS on the White River devotes only two pages to the cumulative impact of water projects on the Colorado Basin. In conjunction with a basin-wide EIS, a Utah-Colorado compact on the White River should be completed before any action is taken. As is, the water allocation on the White River is a matter of laissez faire establishment of water rights.

## 52.3

The White River Dam will cause the massive inundation of some of the state's finest riparian habitat - the loss of fisheries, flora, and fauna. Of particular concern, the White River Dam will cause a change in water quality parameters in the lower portion of the river. The change from a now warm water habitat is not a moot question. There is an issue of three "unloved"

52.3  
(cont.)

fish (at least unloved by Utah's congressional delegation and state agencies). According to the draft EIS, "...three species of rare endemic fish, Colorado squawfish, hump-back chub, and bonvtail cub have been observed in portions of the White River and are officially listed as endangered". Substantial changes in the flow regimen of the White River would, in all likelihood, seriously impair the survival of these already endangered fish. The Utah Division of Water Resources has sought to hold us the issuance of any unfavorable Biological Opinion by the U.S. Fish and Wildlife Service. The Fish and Wildlife Service has yet to provide a formal Biological Opinion on the effects of the White River Dam on the future of these threatened and endangered species of fish. The draft EIS should have never seen the light of day without such a formal Biological Opinion being included.

The threat to the continued existence of these species is of no mere concern to a small group of ichthyologist and environmentalist. The loss of any species is indicative of the death throes of an ecosystem. The loss of these three species of fish would mean the ruination of the Colorado River drainage as a unique warm water fishery habitat. The destruction of a species is ethically justified only if (a) the benefits so derived are shared by the total society at large, (b) the cost of protecting the species is excessively burdensome for the society, and (c) there are absolutely no means of mitigating the survival of

52.3  
(cont.)

that species. The White River Dam project does not meet this criteria.

## 52.4

Utah's Governor Scott Matheson has suggested a congressional or court-ordered exemption to the Endangered Species Act for the Colorado squawfish, the humpback chub, and the bonvtail chub. Such an exemption would be a dangerous precedence, in effect opening the door to exemptions for any energy project that threatens the survival of an endangered species. It would also be a dangerous precedence for short-termed (if not short-sighted) benefits. The draft EIS has indicated that the White River Dam has a productive life of a mere 52 years, with the reservoir completely filling with sediment in a mere 30 years. What is being suggested is the possible reduction in total biological diversity for the sake of extremely short-termed benefits. Both short-termed and limited, for the White River shale project will not play a significant role in changing our national energy outlook. The great "tradeoff" is a few barrels of oil shale fuel in exchange for the ruination of one of our nation's finest free-flowing riverine habitats.

## 52.5

The draft EIS suggest that the White River has only limited recreational visitations. The implication being that the White River is of limited recreational value, being used primarily by a few canoeing expeditions. Please, for many of us, the lack of a sizeable population of recreationist is a virtue, not a vice. This is a river that has twice been suggested as worthy of Wild and Scenic River designation.

Unfortunately, those who will most likely make the decision concerning the White River Dam Project, will not be those who bear witness to the beauty and uniqueness of the river.

52.6

In conclusion, I find the White River Dam Project a violation of the letter and spirit of The Endangered Species Act of 1973, the National Environmental Policy Act of 1969, Council on Environmental Quality regulations, and Executive Order 11720. Further, there is the issue of dam safety that has surfaced in the past few days. Has the Utah Water Resources Agency been honest about the structural integrity of the White River Dam site. Again, I reiterate my support for Alternative 2 (No Action) until a number of substantive issues are resolved.

Yours,

*Calvin Osburn*  
Calvin Osburn  
1304 South 1400 East  
Salt Lake City, Utah 84105

52.1 It is recognized that the economic viability of the White River Dam Project presumes development of the White River Shale Project, along with other synfuel projects. If these projects went into operation, they would, in effect, pay the costs of the White River Dam Project in a reasonable period (about 20 years). In addition, their construction and operation would contribute millions of dollars annually to State and local revenues. To facilitate and encourage these developments, the Utah Legislature authorized and approved funds for the White River Dam Project in 1977. Current indications are that development of these oil shale projects will proceed. See the revised Chapter 1, Purpose and Need section, of this Final EIS for an updated list of White River users. See also Letter Comment 17.1.

52.2 The views expressed will be considered in the decision-making process. A Utah-Colorado compact on the White River is a matter that must be undertaken by the states involved and is, therefore, outside the area of responsibility of those preparing this EIS. See Oral Testimony Response 6 and Letter Response 42.2.

We concur that the Yampa and White Rivers are unregulated tributaries. For more information, see Letter Response 37.7.

Regarding the development of a Colorado Basin EIS, see Letter Response 32.1.

See Letter Response 71.4 for information about salinity in the lower Colorado River.

52.3 The views expressed will be considered in the decision-making process. The FWS Biological Opinion is included in this Final EIS as Appendix 4.

52.4 Thank you for your views and comments. The EIS is intended (under the National Environmental Policy Act of 1969) to be one of the tools used by the decision-maker to reach a conclusion on whether to approve or disapprove right-of-way applications or other applications requesting the use of public lands and resources for the proposed project.

BLM does not control the actions of the legislative and judicial branches of the federal government, but has basic responsibility to execute or carry out the provisions and mandates of laws, regulations, and policies.

52.5 It is recognized that the availability of solitude along major segments of the White River adds to its recreational value for many recreationists. See the revised Recreation sections of Chapters 3 and 4 in this Final EIS.

52.6 The views expressed will be considered in the decision-making process. See Letter Responses 15.2 and 25.13 for information about dam safety.

134 West 400 North #3  
Salt Lake City, Utah 84103  
February 7, 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Subject: Proposed White River Dam Project

Dear Sir:

As a concerned citizen of our environment, I wish to comment on the Proposed White River Dam Project.

53.1 It is pleasing to find the inclusion of alternative 2 in the draft environmental impact statement. I support this proposal.

53.2 I feel that a master plan (interstate compact) for the White River should be developed and that there should be more investigation into the water needs of the oil shale industry.

The destruction of free flowing rivers should be stopped. The above mentioned project would destroy considerable wildlife population and habitat. Our rivers are a unique environment and a precious resource, yet one by one they are being dammed, polluted & developed. Ecosystems are being obliterated, aesthetic quality of landscape is destroyed. Please do not allow the White River to be exploited.

—————→ OVER

I appreciate the opportunity to research, review and respond to this draft EIS.

Sincerely  
Candace Butterworth

## Response Letter 53

53.1 The views expressed will be considered in the decision-making process.

53.2 See Letter Responses 37.3, 42.2, and Oral Testimony Response 6 concerning a White River Master Plan. See the revised Chapter 1, Purpose and Need section, in this Final EIS for new information about oil shale water needs.

## Comment Letter 54

SALLY CRUM  
RT 1 BOX 192  
COLLBRAN CO 81624

4-018200S040 02/09/81 ICS IPHMTZ CSP SLCB  
3034873542 MGH TDMT COLLBRAN CO 150 02-09 1206P EST

DISTRICT MANAGER  
VERNAL DISTRICT OFFICE BUREAU OF LAND  
MANAGEMENT  
170 SOUTH 500 EAST  
VERNAL UT 84078

54.1 IT APPEARS THAT JUSTIFICATION FOR THE CONSTRUCTION OF THE PROPOSED WHITE RIVER OAM PROJECT IS TO SUPPLY WATER FOR DEVELOPING OIL SHALE INDUSTRY. OIL SHALE TECHNOLOGY IS IN SUCH AN INFANT STATE THAT THE TERMINATION OF WATER REQUIREMENTS IS NOT YET PHEASIBLE. IN ADDITION NO STUDY HAS YET BEEN CONDUCTED TO DETERMINE THE POSSIBILITY OF USING APPARENTLY PLENTIFUL GROUND WATER SUPPLIES IN THE REGION. BECAUSE OF THE HIGH RATE OF EVAPORATION FROM RESERVOIRS IN DESERT AREAS, IT APPEARS MORE EFFECTIVE TO PLACE A RESERVOIR AT A HIGHER ELEVATION, UTILIZE GROUND WATER, OR PUMP DIRECTLY FROM THE RIVERS. FURTHER MORE NO AGREEMENT HAS BEEN MADE WITH COLORADO AS TO EACH STATES SHARE OF WATER FROM THE RIVER. I URGE YOUR SUPPORT FOR ALTERNATIVE NUMBER II, (NO ACTION), FOR THE WHITE RIVER EIS. SINCERELY  
SALLY CRUM

1210 EST

MGHCOMP MGH

## Response Letter 54

54.1 The views expressed will be considered in the decision-making process. See the revised Chapter 1, Purpose and Need section, of this Final EIS for information about oil shale water needs. For information on oil shale technology, see Letter Response 56.9.

Regarding use of groundwater, see Letter Responses 25.3, 27.16, 27.17, and 27.28. See Oral Testimony Response 6 and Letter Response 42.2 for information about an interstate water compact.

## Comment Letter 55

Rebecca Lawton  
351 N 200 W  
Sandy, Utah 84070  
February 9, 1981

Mr. Lloyd Ferguson  
District Manager  
Vernal District Office  
Bureau of Land Management  
170 S 500 East  
Vernal, Utah 84078

Dear Mr. Ferguson,

I support Alternative 2 (No Action) as presented in the Draft Environmental Impact Statement of the White River Dam Project. I am opposed to Alternative 1 for the following reasons:

- 55.1 1) The Dam seriously threatens three endangered species of endemic fish. Combined with the effects of the proposed Juniper-Cross Mountain Dam Project on the Yampa River, the White River Dam Project could assure the destruction of Colorado squawfish, humpback chub and bonytail chub.
- 55.2 2) Table 2-1 (pp 39-42) of the Draft EIS proves Alternative 1 to be the least desirable of the 5 Alternatives with respect to unavoidable adverse impacts.
- 55.3 3) Poor geologic suitability of the White River Dam Site as outlined by Howard R. Ritzma, USGS: "Geologic and Economic Evaluation, Site of White River Dam and Reservoir, Uintah County, Utah." Problems with a reservoir above the "Bird's Nest" Aquifer were also summarily recognized by Peter Rutledge, Deputy Conservation Manager, Oil Shale, USGS (letter to Mr. Lloyd Ferguson, Vernal BLM, January 26, 1981). Water loss due to evaporation, through the aquifer and storage area siltation indicates that water storage in the river canyon should be avoided.
- 55.4 I find the Draft EIS lacking in that there is no itemization of costs in Chapter 2 "Description of Alternatives." I think the comparative costs are misleading and very roughly done, showing Alternative 1 as the least expensive alternative (save for No Action). Were pumping costs included in the cost analysis for Alternative 1? Pumping should be a concern for each of the alternatives. I think the estimate of \$12 per acre-foot per annum is vastly understated; I would like to see an itemization of costs.
- 55.5 For a project of such relatively short duration, I feel that damming the White River is not justified. Increasingly popular river-running, diminishing wildlife habitat, already locally abundant reservoir fishing, Ute heritage and the fact that there are alternatives convince me we should develop a sixth alternative more amenable to the development of all the resources the White River area offers. I would propose a pumping project more convenient than Alternative 4 and more reliable than Alternatives 3 and 5 by offering an off-stream storage system (tanks or covered ponds) which would provide the necessary back-up water during periods of low-flow without destroying the White River.

Sincerely,

*Rebecca Lawton*

## Response Letter 55

- 55.1 See the revised Cumulative Impacts section of Chapter 4 and Appendix 10 in this Final EIS.
- 55.2 Your assessment concerning unavoidable adverse impacts is correct.
- 55.3 It is acknowledged that siltation and evaporation would result from this project. For a summary analysis of geological suitability, see Letter Responses 15.2, 25.13, and Appendix 12. For excessive aquifer recharge, see Letter Responses 27.35 and 27.37.
- 55.4 The cost comparisons are "rough, order-of-magnitude" estimates, as stated in the Comparative Analysis discussion of Chapter 2 in the Draft EIS. The costs of pumping from the river/reservoir to the users was not included in the cost analysis because the users, the location and layout of their facilities, and/or the distances and number of pumping stations involved are not known at this time. The \$32 per acre-foot figure is the estimated cost of developing the water (i.e., making a reliable supply of water available). That figure is not to be taken as a projected selling price of the water. The actual selling price would be set by the Utah Board of Water Resources and would enable the state to recover the costs of construction and operation to use the funds for other water developments. Some breakdown of costs is provided in Appendix 6, Tables B through E. Also see Oral Testimony Response 12.
- 55.5 The views expressed will be considered in the decision-making process.

## Comment Letter 56



## NATIONAL WILDLIFE FEDERATION

ROBERT J. GOLTER  
COUNSEL

NATURAL RESOURCE CLINIC  
FLEMING LAW BUILDING  
BOULDER, COLORADO 80509  
303-442-6882

LUKE DANIELSON  
COUNSEL

February 9, 1981

District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, UT 84078

Dear Sir or Madam:

Attached are our comments on the Draft EIS for the White River Dam Project.

The National Wildlife Federation, with over four-and-a-half million members and supporters, is America's largest private conservation organization and is vitally concerned with the wise use and conservation of the nation's resource heritage.

Among the rarest components of that heritage are free-flowing rivers—particularly rivers like the White, which support a diverse riparian ecosystem within a generally harsh environment. The National Wildlife Federation would like to see such rivers preserved in their natural state whenever possible. Thus, we urge that they be impounded when no other alternatives for water development are available.

The Utah Wildlife and Outdoor Recreation Federation is a representative statewide organization, affiliated with the National Wildlife Federation, primarily devoted to the wise use, conservation, aesthetic appreciation and restoration of wildlife and other natural resources.

The essence of our comments revolve around the justifications for, and alternatives to, the proposed project. We believe that if water resource development proposals like this one cannot first be shown to have unique utility, its consideration should proceed no further. We have generally limited our comments to the sufficiency of the Draft EIS. If we have omitted issues in

District Manager, BLM  
Page 2  
February 9, 1981

our comments, such omissions may arise from our attempt at brevity, and we trust that others will address those issues.

Sincerely,

*Ben Harding*  
Ben Harding  
Consultant

dh

Attachment

cc: Colonel Kavanaugh, Corps of Engineers, Sacramento, California  
Rodney Woods, Corps of Engineers, Grand Junction, Colorado  
William McDonald, Colorado Division of Natural Resources  
Sheldon Eppich, President, Utah Wildlife and Outdoor  
Recreation Federation

NATIONAL WILDLIFE FEDERATION  
UTAH WILDLIFE AND OUTDOOR RECREATION FEDERATION  
COMMENTS ON THE WHITE RIVER DAM PROJECT DEIS

As a preface to our comments on the substance of this draft impact statement, we would like to observe that, of the literally hundreds of environmental impact statements we have reviewed, this is one of the best. It is well organized and clearly written, and figures are used to good effect. We found figure 3-6, a color aerial photograph of the White River, to be particularly illustrative--since it strikingly displayed the exotic nature of the White River. But, perhaps most of all, the professionalism of the preparers and consultants is shown by the extensive references, the inclusion of a comprehensive bibliography, index, and glossary. Though a minor point, we also appreciate the clear printing.

In substance, we have several reservations about the document:

A. Project Justification

56.1

We recommend discussing first the need for water, and power, from the White River and holding the discussion of the capabilities of alternative systems until the alternatives section. More specifically, we see that the proposed uses of White River water are tentative and highly speculative--based on the preliminary plans of a number of private companies pinned to a volatile petroleum market and the expectation of subsidy from the Federal Government.

Just less than a page is used to discuss the proposed uses of water from the White River Project. On this scanty discussion hangs the entire remainder of the analysis and, presumably, a future decision regarding BLM's issuance of right-of-way permits for the project.

This project would require a significant investment of public lands and a unique public natural resource, held in trust for all citizens. Considerably more effort must be expended to identify the need for the proposed federal action, and so conform to the letter and spirit of NEPA.

To this end, we recommend that the best independent estimates of the projected extent of the energy industry in the area be obtained, with particular attention paid to the schedule for energy development. Then, using the best information available, the amount of water needed to support that development can be expressed as a function of time--with the upper and lower limit for both quantity and timing expressed in some appropriate format. In this way, a range of water demand projections would be presented--from the most pessimistic, that is the highest and earliest, to the most optimistic.

- 56.2 Projection of development should come, in part, directly from the private companies which propose it. In this connection, we note that none of the five companies whose developments are discussed on page five, and who are expected to be large consumers of water, is listed in the bibliography. TOSCO and WPSR both have indicated that their timetables for development are "not set" or "uncertain." Little weight can be assigned to informal discussions of possible development scenarios; potential water users must come forward with specific and concrete plans which can be publicized and opened for critical review.
- 56.3 Water demand should be expressed both as an average annual requirement, that is acre-feet per year, and as a flow rate, in cubic feet per second, to provide a basis from which to determine the minimum diversion facilities necessary.
- 56.4 We find no mention of the loss of water to evaporation and infiltration. We estimate evaporation losses from the reservoir would be in the range of 4,000 through 7,000 A.F./year. Also, it is possible that significant amounts of water could be lost due to infiltration into surrounding strata. This issue should be addressed.

#### B. Alternatives

- 56.5 Our second major concern with the present draft is the discussion of alternatives—which we consider weak for several reasons:
1. Though the no-action alternative is fairly well described under the Description of Alternative section, analysis of this alternative is not carried far enough. It seems obvious that viable private energy development concerns will, at their own initiative, seek alternative sources of water if the White River Project is not built. Perhaps projected water demands could be met by leasing water from the Ute Indians as is proposed on page five, or by supplementing water directly diverted from the White River with groundwater or retort water.

The no-action alternative is not meant to imply no water development, but rather no Federal action—no issuance of rights-of-way required for construction of the proposed White River Dam. There are many alternate avenues left open to potential water users and these possibilities should be noted under the No-Action scenario and comprehensively described somewhere in the EIS.

1/ White River Dam Project, Proposed Action Plan, (Utah Division of Water Resources), August, 1979.

- 56.6 2. We view the menu of alternatives discussed in the document as incomplete. We recognize that a discussion of alternatives could be carried on without bound, but we feel strongly that there are some obvious alternatives to the project that should be examined. First is the possibility of augmenting direct diversion of water from the White River with use of groundwater resources in the area. As pointed out several times in the document (notably page nine) direct diversion from the White River would be sufficient for the projected water needs of the oil shale industry 49 out of 50 years, based on historical data.
- We propose the use of water from the Birds Nest Aquifer or the Douglas Creek Member of the Green River Formation, as a supplement to water diverted from the White River, as a viable alternative to construction of a large reservoir—one which should be considered more thoroughly. We recommend coordination with the U.S.G.S., particularly their Oil Shale Office, in Grand Junction, Colorado, in order to utilize their groundwater expertise.
- 56.7 Attention must be given to the possibility, if modified in-situ retorting is used to any extent in the area, that "retort water" will be produced and that the quantity of this water will prove to be sufficient for most, if not all, of the needs of the local oil shale industry. In fact, some studies indicate that 22 barrels of water may be produced by a modified in-situ oil shale retorting facility for every barrel of oil. The water quality requirements in the State of Utah and in the Colorado River Basin will demand that oil shale retort waters be treated to a quality approaching that of surface water before they can either be discharged or reinjected. This being the case, it seems clear that such treated waters would also be of a quality sufficient to allow their use for industrial processes.
- Yet another alternative is the use of one of the saline water sources which are presently the subject of studies regarding use and ultimate disposal. We recommend close coordination with the WPSR Water Quality Office in formulating this alternative.

- 56.8 3. Water costs have not been appropriately presented. If diversion will suffice for 49 out of 50 years, the proposed reservoir would be necessary only for supplemental water 1% of the time. Thus, it is not clear that it is appropriate to calculate water costs based on the total cost of the project

2/ Fox, J.P., Farrier, D.S. and R.E. Poulsen, "Chemical Characterization and Analytical Considerations for an In-situ Oil Shale Process Water," DOB, 1978.

- 56.8 (cont.) and the total amount of water it yields, rather than on the incremental cost, and quantity of water produced. Further, water cost calculations should reflect that the efficiency of the reservoir will begin to be impaired by sediment after 33 years (p. 22).

More fundamentally, we question whether calculating the cost of producing water is really an appropriate method of economic analysis. On page 43 this point is raised but not given prominent display. We feel that each alternative analysis should include the cost of water on the basis of barrels of oil produced. So, too, should Table 2-2. For example, based on a water requirement of 4 bbl of water to 1 bbl of oil, a conservative estimate, the incremental cost from pumping water from the Green and White Rivers (Alternative 5) is only 2.4 cents per barrel of oil.

- 56.9 4. The reservoir project is only necessary to increase the allowable rate of oil production. By staging shale-oil production, it would be possible to limit water withdrawal requirements without limiting the total quantity of petroleum products recoverable. Yet no mention is made of the rate of oil shale development which could be supported under the no-action scenario.

- 56.10 5. Consideration should be given to the possibility of a coordinated development scheme on the White River based on joint action by the states of Colorado and Utah. As is noted in the DEIS (p. 10) one potential alternative dam site was eliminated from consideration because it would back water into Colorado, "... a situation unacceptable to the State of Utah." We reject this basis as a justifiable one for rejecting an alternative.

In the specific case cited, it is possible that the alternative had no utilitarian advantage over the proposed action, but we can foresee that a single reservoir, constructed higher on the White River in Colorado, could serve to optimally utilize the waters of the river for industrial purposes while at the same time minimizing the total environmental impact of development. Such an alternative should be comprehensively discussed in the final EIS. (See comment C-2 below.)

C. Specific Comments

We have the following specific comments concerning the document:

- 56.11 1. Page 3. An increase in salinity at Imperial Dam on the Colorado River of 3.4 milligram per liter is projected. Though salinity increases might be comparable for each of the alternatives, it seems important that some accounting be made of the cost of increased salinity.

2. Page 4. Mention is here made of the concern that cumulative impacts of this project along with others may be more severe than the isolated impact of this project alone. We concur, and have requested that the Army Corps of Engineers complete a programmatic environmental impact statement for development on the White River. We commend this policy to the Bureau of Land Management, and include for reference a copy of our letter to the Army Corps of Engineers, dated November 19, 1980.

3. Page 30. We appreciate the recognition in this section that "the no-action alternative could be applied for a short time or a long, indefinite period" and "the no-action alternative would be intended to avoid major commitments of resources at this time in order that conflicts between energy needs and environmental values (especially endangered fishes) can be further studied."

This statement serves as a good description of the planning flexibility inherent in adopting the no-action alternative.

- 56.12 4. Page 32. The document speculates that "future increased depletions from the White River in Colorado would increase the frequency of need for water from Hells Hole Canyon Reservoir." We disagree. It is likely that increased depletions from the White River in Colorado will be accomplished by construction of a significant reservoir, which could, if properly planned, enhance the ability of Utah to divert the necessary water directly from the White River.

- 56.13 5. Page 53. We would like to see a more comprehensive discussion of groundwater hydrology and quality in the context of its potential as a resource.

\* \* \*

We trust these comments will be taken in the constructive manner that they have been submitted. If there is any need for clarification, please feel free to contact us.

November 19, 1980

Col. Paul F. Kavanaugh  
District Engineer  
Sacramento District  
Army Corps of Engineers  
650 Capital Mall  
Sacramento, CA 95814

Dear Col. Kavanaugh:

In response to your request (found in Public Notice #7277, 6 October 1980), we have the following brief comments regarding issuance of a Section 404 permit for the Taylor Draw Dam, part of the Rangley project on the White River upstream from Rangley, Colorado.

We understand, but have not been able to confirm, that there are presently more than 30 water storage projects proposed for the White River with aggregate diversions projected to be at least one million acre-feet annually.

The White River yields, annually, an average of approximately 500,000 acre-feet of water. Thus, it appears that there is a possibility, at least, for over appropriation and inefficient development of the River diversions and storage facilities are constructed in a helter-skelter fashion. Given the importance of the White River as a natural resource--for recreation, aesthetic, and wildlife purposes--and as a source of water for energy development, it seems that the public interest can best be served by the preparation of a comprehensive environmental impact statement relating to its development.

The Army Corps of Engineers, with its responsibility to issue § 404 permits for any significant construction affecting this river and with its broad public interest review responsibilities (33 C.F.R. 323.4), would seem to be the appropriate agency to undertake such a comprehensive planning function. See 33 C.F.R. 209.410; also 230.11(c).

There is precedent for such action on the part of the Corps. The courts have recognized the need for a comprehensive EIS concerning a galaxy of proposed projects in the same geographic region.

Col. Paul F. Kavanaugh  
Page 2  
November 19, 1980

See Kleppe v. Sierra Club, 427 U.S. 390, 410 (1976) ("\* \* \* when several proposals for \* actions that will have cumulative or synergistic environmental impact upon a region are pending concurrently \* \* then environmental consequences must be considered together"); see also Green County Planning Board v. Federal Power Commission, 559 F.2d 1227, 1232 (2nd Cir. 1976), cert. denied, 434 U.S. 1086 (1976) ("\* \* \* an agency is required to consider the full implication of each decision in light of other potential developments in the area, and to prepare a comprehensive impact statement if several projects are significantly interdependent").

Recently, in NWI v. Bonn, 491 F. Supp. 1234, 1250, 1251 (S.D.N.Y. June 1980), the Court--in the context of the Corps' permitting practices--criticized several project-specific impact statements and assessments as falling "far short of presenting a comprehensive picture of the environmental impact of the proposed activity. . . ."

We, therefore, strongly urge the Corps of Engineers to prepare an EIS which not only includes consideration of the Taylor Draw Reservoir, but all other proposed water resource development on the White River. See also CLO regulations, 40 C.F.R. 1508.25 (a) (2) and (3), regarding the proper scope of EIS's relating to "cumulative" and "similar" actions taken by the same agency.

While such an effort might be viewed by some to cause unnecessary delay, it is our view that, in the long run, all the various interests concerned with the White River will best be served by putting together--now--a plan for its development, rather than simply letting development occur piece-meal and haphazardly.

We would appreciate any comments, formal or informal, that you might have on this request.

Sincerely,

Ben Harding  
Consultant

dh

cc: Rodney Woods, Corps of Engineers, Grand Junction, Colorado  
Wes Wilson, EPA  
Jim Belsey, Trout Unlimited  
Sheldon Eppich, President, Utah Wildlife Federation

## Response Letter 56

- 56.1 See the revised Chapter 1, Purpose and Need section, of this Final EIS for a discussion of water needs. As your comment relates, the schedule for regional energy development will be dependent upon future market conditions and support from the Federal government. Both of these economic factors are uncertain because of energy deregulation and debates over Federal budget constraints for synfuels.
- 56.2 Projected water needs of oil shale development companies have changed substantially since publication of the Draft EIS. Please see the revised Chapter 1, Purpose and Need section, in this Final EIS for updated information. Also, see Oral Testimony Comment and Response 22.
- 56.3 Water demands and needs are expressed both as an average annual volume (acre-feet) and instantaneous flow rate (cfs) requirements in this EIS. The annual demand is expected to be 70,000-75,000 acre-feet. This is a consistent flow rate of 97 to 104 cfs. The conversion factor of 1 cfs for a 1-year period is about 724 acre-feet.
- 56.4 Evaporation losses are mentioned in the EIS. Evaporation losses are estimated at about 5,500 acre-feet per year. Studies have been conducted on possible leaks in the reservoir substrata. Please refer to Letter Responses 27.15, 27.35, 27.37, and Appendix 12 for more information.
- 56.5 It is assumed that energy development companies would develop their own water sources should the White River Dam not be built. Please see Alternative 2.
- The Ute Indians might lease all or part of their White River water in the future; however, the use of Indian water rights for energy development is uncertain at this time. In regard to using groundwater, see Letter Response 56.6.
- 56.6 Please refer to Letter Responses 25.3, 27.16, 27.17, 27.28, 27.29, and 27.35 for information regarding your concerns.
- 56.7 Water needs were analyzed on a "worst-case" basis. Data regarding water quality and quantity from the oil shale retort process are still not complete. Recycling water is a consideration in synfuels technology to obtain efficient and zero discharge. As energy industries continue to develop oil shale and tar sand processing techniques, close coordination will be done with the various agencies involved with water use.
- 56.8 The discussion on page 9 of the Draft EIS which indicated that in 49 of the past 50 years the 97 cfs could have been taken directly from the river was in error. Study of flow data indicates that flows of less than 350 cfs occur approximately 20 percent of the time and, that to supply 97 cfs to users and 250 cfs to meet downstream requirements, storage or regulation would be required nearly every year. In addition, irrigation withdrawals in Colorado have increased in recent years and, as indicated in Table 4-14, it is anticipated that oil shale development and associated growth in Colorado will deplete from 90,000 to 172,000 acre-feet per year by the year 2000. Thus, direct pumping could not supply the 97 cfs on a regular basis in the future. For example, in August 1981, flows

- 56.8 (cont.) would have been inadequate and withdrawal of 97 cfs would have essentially dried up the river. Thus, there is no basis for calculating incremental water costs other than comparing the total costs of each alternative for the project's life.
- The companies involved in energy development in the region require a reliable water supply to operate plants costing several billion dollars. Either the companies must develop water sources on their own (which would be the case under Alternative 2, No Action), or one of the alternatives discussed in the EIS must be constructed.
- The costs of providing the water on a capitalized annual basis for each alternative merely provides a convenient basis for economic comparison.
- It is recognized, as you state, that the increased water costs of Alternatives 3, 4, or 5 would cause a minimal increase in the costs of producing shale oil.
- 56.9 The rates and trends of projected oil shale development are not definitely known because of uncertainties such as market trends due to petroleum price deregulation, the current surplus of existing petroleum products, and possible reduction of Federal subsidies. In addition, the water resource dependency of emerging energy technologies and requirements is not specifically known. See also Letter Response 56.1.
- 56.10 Your concerns have been addressed; please see Letter Responses 25.2, 42.2, 56.12, and Oral Testimony Response 6.
- 56.11 Your concerns are discussed on page 98 of the Draft EIS. Also, refer to Letter Responses 6.2 and 6.4.
- 56.12 Your observation is correct; a dam on the White River in Colorado could supplement the proposed White River Dam in the same manner as the alternative Hell's Hole Canyon Reservoir. However, water use compacts have not been developed between Utah and Colorado and the water from such a dam could be obligated to other purposes. Therefore, an alternative based on such a dam would not be feasible at this time.
- Please refer to Letter Response 42.2 and Oral Testimony Response 6 for other information.
- 56.13 Please refer to Letter Responses 25.3, 27.16, 27.17, 27.28, and 27.29. Because of the problems associated with groundwater, it was not considered to be a potential resource for this proposal.

7 February 1981

District Manager  
Verona District Office BLM  
170 South 500 East  
Verona, Utah 84018

Sir,

Please include the White River DEIS comments in the public record and address them in the final EIS.

- 57.1 1. I believe the study of the lake should be criticized for generating its proposed alternative without considering the environmental impacts of any of the available alternatives.
2. I strongly oppose Alternative 1 and support Alternative 2 because the reserve is plagued with inefficiencies and because the economic and environmental cost/benefit does not benefit the people of the state of Utah.
3. No need for the reservoir has not been firmly established.
- 57.2 4. The assessment of Recreation (p. 69) is inadequate and inaccurate. As a single 3 day canoe trip last Labor day we had 26 persons in 12 canoes. The White River is excellent for beginning & intermediate canoeists and for extended

57.2  
(cont.)

canoe ranging days. Local sporting goods stores have enjoyed a 4x increase in missile powered fishing sales in the past 5 years. The White River will gain increasing importance and notoriety as an excellent canoe stream of current trends (involving primitive recreation, costs of gasoline and family activities) continue.

- 57.3 5. Environmental consequences in Vegetation (p. 61) should include the displacement of cottonwood by water tamarisk below the dam site.
- 57.4 6. Assessment of recreation should include the observation that adequate flatwater recreation already exists in the project area.
- 57.5 7. I find no DEIS discussion of the high sediment rate and its impact on the usable life of the reservoir. If estimated at 1200 acre ft per year this has a significant effect on the cost/benefit ratios of the project, both economically & environmentally. Naturally, we can assume the "conservation pool", not some user allotment, to be filled with silt first!

57.6

8 Similarly, U.S. DCR fails to mention site suitability from a geologic point of view. Recent publications by the Utah Geological and Mineral Survey (June 1970, August 1980, November 1980) raise serious questions. I understand Bingham Engineering is doing additional testing with what has been described as "a piece of junk someone else throws away." Since Bingham is the prime White River contractor (without having to go through a bid process I might add) and the continuation of its \$30 million contract is dependent on the geologic suitability which Bingham itself is testing, I urge the BLM to demand third-party study of its geologic problems. I request that the three DCRS memos, reports and publication be included as part of my comments.

Thank you

Jim Hissot  
1751 Lake Street  
Salt Lake City 84115

# UTAH GEOLOGICAL & MINERAL SURVEY

DEIR COMMENTS  
Jim Hissot

## NEW U. S. BUREAU OF MINES BUILDING DEDICATED

(continued from page 1)

the facility. Today in its new quarters, the facility has become the Salt Lake City Research Center because the former separation of Bureau functions into separate mining and metallurgical facilities has been abandoned and moving research may be conducted at Salt Lake City in the future although the principal emphasis will probably remain on metallurgy. The new building was constructed below estimate at a cost of approximately \$10.6 million including furnishings and equipment. It contains a total area of 71,000 square feet. Behind the building is an array of solar panels which will provide hot water for space heating. A heat pump system has been installed for air conditioning during the summer months.

Research which is presently being conducted includes development of a technique to extract tungsten from the brines of Seaboard Lake in California; development of methods to recover non-magnetic material produced by automobile shredders; development of a circuit process for removing sulfur dioxide from stack emissions; cultivation of plant species capable of growing on mine waste piles; methods for extracting cobalt from the complex ores of the Blackhead region in Idaho; and a substantial number of other tests and experiments to increase efficiency in prospecting, testing and using mineral substances.



## MINERAL INDUSTRY BRIEFS

### Cement

Martin Marietta Cement Company broke ground for its new plant near Lemmonington in Utah County in the spring. The plant will cost about \$5 million dollars and will have a 650,000 ton per year capacity, roughly equal to the present annual consumption of cement in Utah. The mine is expected to open in March, 1982. Martin Marietta is opening a division in Salt Lake City.

The Breckhe Chemical Company also plans to build a cement plant on 80 acres of land near the Keigley Quarry in Utah County.

### Magnesium

AMAX, Inc., has agreed to purchase NL Industries, Utah Magnesium Division, with facilities on Great Salt Lake for \$60 million. AMAX plans to increase the capacity of the plant from the present 28,000 tons of magnesium to 45,000 tons per year. This would make AMAX the second largest producer of magnesium in the world (Dow Chemical is first). The plant now employs 700 workers.

### Uranium

Energy Fuels Nuclear held an open house at its new White Mesa Uranium Mill, six miles south of Blanding, San Juan County, Utah. The mill started production in May and is designed to process 2,000 tons of uranium ore per day.

Mountain States Resources has acquired 7,131 acres, including the North Canyon Project and six state mineral leases. These are adjacent to its Cave and Sandbar properties in Emery County on which positive results have been reported from recent exploration for uranium.

Exxon has received approval from the BLM to drill for uranium within the Fifty Mile Mountain Wilderness inventory unit in the Kaiparowits Plateau. Exxon is planning to drill 20 holes, and will build dirt roads for access to the drill sites.

Falcon Enterprises, Inc., has expanded its holdings in the Wolf Wash Mountains in Beaver County in southwest Utah. It has acquired a 25% interest in 3,380 acres and a 75% interest in 663 acres of leases. Discoveries of uranium and molybdenum have encouraged intensive evaluation by several companies.

## WHITE RIVER DAM ENDANGERED

The proposed White River Dam, to be built in eastern Utah County, was designed to provide water for, among other uses, tur and oil shale development. But it has been alleged that three endangered species of fish live in the steady waters of the White River and that construction of the dam may destroy their habitat. The three fish are the hump-backed chub, the Colorado square goby, and the bony-tailed sucker.

Several companies experimenting with oil shale production techniques in the area are concerned lest the construction of the dam be blocked by the Endangered Species Act. The White River Pipeline Project will send 27,000 acre feet of water a year when it reaches full production of 100,000 barrels of oil a day and other firms will send equivalent amounts of water.

Studies for the dam have been underway for at least five years by the Utah Division of Water Resources. Construction drawings are to be completed in the spring of 1981 and authorization has been given to the division to negotiate with owners of private lands to complete division ownership of the reservoir area.

Two reports written by two staff geologists of DCRS in 1976 and 1980, point out difficulties in the geologic setting of the dam site and reservoir. The proposed dam, 2500 feet long and 130 feet high, will be anchored in relatively incompetent, jointed Tertiary formation sediments. The extensive joint system of the area may permit leakage of water from the proposed reservoir into mine workings beneath, downing from, and adjacent to the reservoir floor. Both problems are being addressed in design and construction of the dam and planning for mining.

COPY

LESLIE D. KIMMELMAN  
Director

## UTAH GEOLOGICAL AND MINERAL SURVEY

606 BLACK HAWK WAY  
SALT LAKE CITY, UTAH 84108  
(801) 581-6821SCOTT M. MATHESON  
GovernorGORDON E. HARMETON  
Executive Director  
Department of Natural Resources

October 31, 1980

## MEMORANDUM

TO: Gordon Harmeton, Executive Director, DNR

FROM: Howard Ritzma, Assistant Director, DNR

SUBJECT: White River Dam and Reservoir

This morning (10-10-80) I met with Mr. Ross Madsen, White River Shale Project (WRSP); Lowell B. Page, mining engineer, Cordero Mining Company; R.C. Cummings, Senior Project Engineer, Mine Development, Phillips Petroleum (WRSP); and C.E. Doney, Project Manager, Phillips (WRSP), in the offices of Senior and Senior, Salt Lake City.

We agreed that the integrity of the White River Dam site - anchoring it in jointed Uinta Formation - was a matter of concern but that it is certainly one that can be met and remedied if the difficulties are recognized in advance and necessary action taken in design and construction. There was general agreement that this is being done at present and will continue to be done.

As to possible loss of water into mines from the reservoir, either into joints, aquifers and bedding planes, we also agreed that there is a very definite problem present. However, the structure of the area - prevailing dip to west and northwest - will tend to minimize this problem in Tracts 9a and 9b but will make it a matter of much more concern west and northwest of the reservoir. In particular, the existence of the reservoir will virtually exclude the possibility of mining oil shale beneath the reservoir proper and in the areas between the major meanders such as sections 10 and 16, T. 10S., R. 24E. This means the fee tracts which were originally the subject of this investigation (as to their mineral value) should be considered as virtually unminable.

It should be noted that in drawing the boundaries of the 9a and 9b tracts in the early 1970's, the fee acreage along the river and the river itself was carefully avoided despite the fact that the richest and thickest shale in Utah lay beneath it. I was one of two or three persons responsible for drawing these boundaries. I guess you can call this foresight - or luck.

White River Shale has already investigated the jointing situation to some extent and has drilled two slanted coreholes to intersect possible

COPY

joint systems. From these they have concluded that the extensive joint system seen in the Uinta Formation does not extend downward into the Green River Formation. The cores indicated that the Green River is dense, impermeable, very competent, and relatively free of fractures and joints. However, White River Shale probably will do more coring and other investigation of the jointing and fracturing in the tracts.

There was agreement that there will always be the possibility of leakage from the reservoir through various conduits into mining areas, even in Tracts 9a and 9b. The operators of these tracts seem confident that the problem can be handled and is not a barrier to development.

Since they are the operators, they are assuming the risks that are involved. I think they feel it has been instructive and useful to review the problem, particularly in advance of actual construction and design of the dam and commencement of mining. They seem willing to go ahead.

HOWARD R. RITZMA

HRR:ay



LEONARD T. McMILLAN  
Director

# UTAH GEOLOGICAL AND MINERAL SURVEY

666 BLACK HAWK WAY  
SALT LAKE CITY, UTAH 84108  
(801) 581-6311

June 3, 1976

CAVIN L. HAMPTON  
Engineer

GORDON E. HAMPTON  
For the Director  
in partnership of Federal and State

## MEMORANDUM

TO: Hellmut H. Doelling

FROM: Fitzhugh D. Davis

SUBJECT: Proposed White River Dam

On March 19, 1976, Mr. Daniel Lawrence of the Division of Water Resources requested that a geologist from UGMS attend a meeting in Vernal concerning the proposed White River Dam. Mr. McMillan picked me to take care of this project. Subsequently, May 26, 1976, was chosen as the meeting and field trip date. The purpose of the meeting was to familiarize state agencies with the proposed White River Dam in the SW NE Sec. 17, T10S, R24E, SLB&M (see attached map). Most of the land in the vicinity of the project (eastern Uintah County) is controlled by the BLM and they will need to make an environmental assessment report of the proposed dam and reservoir. Solicitations will be made to various state agencies to provide input. The State Division of Water Resources has received funds to build the dam.

At 9 a.m. on May 26, 1976, everyone concerned (about 35 people) met at the White River Oil Shale Project office, 1315 West Highway 40, Vernal, Utah. A few of the major aspects of the proposed dam are:

1. It will be a zoned earthfill dam with a clay core.
2. The dam will be 125 feet high above the stream bed.
3. It will have a length of 2,480 feet along the crest.

The reservoir will have a capacity of 118,000 acre feet and will have a length of 12 miles. The maximum width will be 0.8 miles. Some of the project benefits will be: (1) water supply for oil shale

Page 2

industry, (2) more consistent irrigation water supply, (3) a reduced sediment load in the river, (4) a more uniform water quality, and (5) to reduce flood peaks on the White River.

## GEOLOGY

The vicinity of the proposed dam is covered by the Uinta Formation of Late Eocene age (see attached geologic map). According to G. E. and B. R. Untermann (1968, p. 53) the Uinta Formation, in eastern Uintah County, consists of interbedded gray, buff, brown, and reddish brown sandstones and gray, white, purple and red mudstones, siltstones and clay shales of fluvial origin. The unit ranges from 900 to 1,300 feet in thickness in this area and forms a badland topography with deeply dissected steep walled canyons and narrow flat surfaced interstream divides. Mesas, buttes, and canyon walls have steep cliff-ledge profiles eroded from soft and resistant beds in the formation.

Erosion has revealed the underlying Green River Formation (Middle Eocene) about 4 miles east of the proposed dam site. The contact is conformable and transitional.

The Uinta and Green River Formations in the vicinity of the proposed dam have a slight  $1^{\circ}$  to  $2^{\circ}$  dip northwest into the Uinta Basin syncline (Cashion, 1974).

The dam site. The abutments for the proposed dam will be in the Uinta Formation. The abutments consist of mostly thin to thick bedded light gray and tan fine to medium grained sandstone. Almost all the sandstone is friable and consists of sub-rounded quartz and feldspar grains with some mica flakes. Several interbeds of light gray platy shale, ranging in thickness from 1 to 3 feet are also present.

The beds dip almost imperceptibly northwesterly and do not appear to be too badly jointed or fractured. No major faults are in the area.

I recommend a thorough study of the dam abutments and foundation rocks. The orientation and spacing of fractures, joints, bedding planes, and other zones of weakness should be determined. The investigation should determine the physical and mechanical properties of the rocks; including direct and shear strengths and permeability and filtering properties. A hydrogeological investigation should also be made to

obtain data on seepage losses, seepage pressures, possible mechanical or chemical piping, and groundwater quality and pressures.

For a dam of this size the stream channel and floodplain deposits should be excavated to firm bedrock. The extent and thoroughness of grouting in the foundation and abutments should be based on the above findings.

Economic geology. The Green River Formation is a thick sequence of marlstone, shale, siltstone, oil shale, sandstone, and limestone. The formation has been divided into the following members, in ascending order: Douglas Creek, Garden Gulch, Parachute Creek, and Evacuation Creek. The Parachute Creek Member is of immediate economic importance.

The measured thickness of the Parachute Creek Member ranges from about 365 feet along Evacuation Creek to about 615 feet along the White River (Cashion, 1967, p. 15). The unit consists of gray and tan marlstone and dark gray and brown oil shale with some thin beds of tan siltstone. A kerogen rich sequence, the Mahogany zone, crops out several hundred feet below the top of the member. The Mahogany bed (or ledge) is about 10 feet thick and is the richest bed in the zone. It occurs about 40 feet below the top of the zone. In the area of this report Ritzma (1974) shows that the thickness of oil shale yielding 25 gallons per ton ranges from 100 to 130 feet thick. The rich oil shale zone underlies all of lease tracts U-A and V-b.

The mean high water line of the proposed reservoir will be at an elevation of 5,010 feet. Beginning just east of the confluence of Evacuation Creek and the White River the Mahogany zone will be inundated. The inundation will extend eastwards to about where Weaver Canyon joins the White River, a distance of approximately 2.1 miles. Perhaps as much as 1,000 feet of the oil shale on each side of the White River will be lost to mining for this distance. Using an average saturation distance of 1,000 feet (it could be more) and an average thickness of 100 feet for the rich oil shale; a total of 81.5 million cubic yards would be lost. This would amount to more than 2 billion gallons of shale oil.

The benefits of the proposed dam and reservoir may outweigh this loss. At least someone should give it some thought. The oil shale industry and resultant growth in population will certainly require a water supply.

No mapped gilsonite veins will be inundated. Oil shale and gilsonite are the only known items of economic importance in the region besides petroleum in the subsurface.

#### REFERENCES CITED

- Cashion, W. B., 1967, Geology and Fuel Resources of the Green River Formation, Southeastern Uinta Basin; Utah and Colorado; U. S. Geol. Prof. Paper 548, 48 p.
- \_\_\_\_\_, 1974, Geologic Map of the Southam Canyon Quadrangle, Uintah County, Utah; U. S. Geol. Survey map, MF-579.
- Ritzma, H. R., 1974, Active Oil Shale Lease Block, Eastern Uinta Basin, Utah; UGMS file no. 1377 C.
- Untermann, G. E. and B. R., 1968, Geology of Uintah County, Utah Geol. and Min. Surv. Bull. 72, 98 p.

Respectfully,

*Fitzhugh D. Davis*  
 FITZHUGH D. DAVIS  
 Geologist

FDD/dd

GEOLOGIC AND ECONOMIC EVALUATION  
SITE OF WHITE RIVER DAM AND RESERVOIR  
UINTAH COUNTY, UTAH

by  
Howard R. Ritzma  
Chief, Petroleum Section  
and  
Assistant Director  
Utah Geological and Mineral Survey

for  
State of Utah  
Department of Natural Resources  
Division of Water Resources

August 1980

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GEOLOGIC AND ECONOMIC EVALUATION  
SITE OF WHITE RIVER DAM AND RESERVOIR  
UINTAH COUNTY, UTAH

GEOLOGY

STRATIGRAPHY

The formations exposed on the surface in the area of the tracts are the Wasatch, Green River and Uinta Formations of Eocene age with a variable amount of Quaternary terrace deposits and alluvium along stream courses. The bottom of the canyon of the White River especially has a wide and relatively deep fill of alluvial silt, sand and gravel.

These formations are described adequately in the geologic literature and other reports on the area. This is not repeated herein. Figure 1 illustrates the general stratigraphic section.

STRUCTURE

The structure of the area is quite simple. The formations dip west and northwest into the Uinta Basin. From east to west dip decreases from about 400 feet to the mile ( $4\frac{1}{2}^{\circ}$ ) to 150 feet per mile ( $1\frac{1}{2}^{\circ}$ ) in section 17 at the proposed dam site. The tracts lie along the White River in the bottom of a very broad, low-order structural trough or syncline between two broad, gentle anticlines, Bonanza to the north and Rainbow to the south.

A unique structural feature of this area are extensive parallel joint or fracture zones mostly aligned N55<sup>o</sup> to 70<sup>o</sup>W and extending for up to 30 or more miles. The joints along the crests of the two anticlines are filled with the solid hydrocarbon, gilsonite and these remarkable "veins" constitute the economic deposits of gilsonite of the region which have been mined for many decades.

A few thin and less extensive gilsonite veins are found in the synclinal area where the tracts concerned in this report are located.

Many of the joints and fractures in the study area stand open and are void space.

There is also a very well developed secondary set of joints of ENE-WSW trend that intersects the primary joint set at an oblique 120<sup>o</sup> angle. These joints are not gilsonite-filled but are quite wide and open in many instances.

PETROLEUM ( OIL AND NATURAL GAS)

OIL-POTENTIAL FOR DISCOVERY AND DEVELOPMENT

The area of these tracts is considered to have low potential for discovery of oil and natural gas liquids (NGL) at depths from surface to 8,500 feet (Tertiary through Upper Cretaceous Mesa-verde Formation). At depths greater than 8,500 feet, the high cost of drilling to those depths and the generally unfavorable structural situation make the potential for the discovery of oil and NGL low. However, since the geologic situation, principally the stratigraphy of these deep formations, is totally unknown, the possibility of discovery of oil and NGL beneath these tracts can not be discounted totally.

In the context of short energy supplies and high wellhead prices for crude oil and NGL at present and in the future, there is no doubt that any discovery of oil or NGL in the area of these tracts will be developed and find ready sale of production. Even modest production will be trucked to whatever market is readily available.

# NATURAL GAS - POTENTIAL FOR DISCOVERY AND DEVELOPMENT

The area of these tracts is considered to have excellent potential for the discovery of natural gas at depths from surface to 8,500 feet (Tertiary through Upper Cretaceous Mesaverde Formation). Immediately to the south the Southman (sic Southam) Canyon gas field, discovered in 1955, has produced about 723 million cubic feet of gas from Wasatch (Eocene-Tertiary) and Mesaverde (Upper Cretaceous) sands through 1979. In March 1980 three of five producible wells in the field were recorded as producing gas with some condensate (natural gas liquids).

This entire portion of the Uinta Basin may be considered as potentially productive of gas from tight (low permeability) sands. With suitable fracturing techniques these sandstones, largely in the Wasatch and Mesaverde Formations, can be expected to produce large quantities of natural gas from thick producing sands over long periods of time. Research and field trials of these techniques are at present being supported by the U.S. Department of Energy in the Uinta Basin with expenditure of \$100 to 175 million. There have been good results in reviving old producing areas and completion of new wells.

Development of an oil shale industry with mining, processing and refining and population centers in the vicinity can be expected to stimulate exploration for and development of natural gas in the area of these tracts. Even modest discoveries with low productive potential would be afforded a ready market nearby. The low cost of transporting this gas short distances would enhance its marketability.

The deep gas potential, deeper than 8,500 feet, is almost wholly speculative but should be regarded as good. At least 15,000

feet of older sedimentary formations lies below the Mesaverde Formation. Much of this sedimentary rock is highly organic with at least six excellent sandstone or limestone reservoir zones interbedded in the section. The combination of these favorable factors with sufficient depth of burial, heat and pressure, should produce a highly favorable environment for the generation and entrapment of large quantities of gas.

## IMPACT OF DAM AND RESERVOIR ON POTENTIAL FOR PETROLEUM (OIL AND NATURAL GAS)

Oil and natural gas is almost totally explored for and produced on a unitized basis on drilling units of a size set by regulatory agencies, Federal and State. These tracts would be expected to become parts of drilling units of 40, 80, 160 and 640 acres depending on the size set by regulation and would participate in the gross production of gas, gas liquids or oil from the drilling unit regardless of the location of the well within the surface area of the unit. Techniques of directional drilling make it possible to position the bottom (or potential producing zone) of a well almost anywhere at a predetermined depth beneath a drilling unit.

The dam and reservoir planned for this area will have no adverse impact on oil and natural gas exploration and production, and, as previously mentioned, may stimulate such activity.

## OIL SHALE

ESTIMATES OF GRADE OF, DEPTH TO, THICKNESS OF, AND VOLUME (IN BARRELS) OF OIL SHALE BENEATH TRACTS 1, 2, 3, 4a, 4b, 4c and 5.

The following table presents an estimate of the depth to,

thickness of, and volume of oil in barrels of the principal oil shale zone beneath the seven tracts considered in this study.

The principal oil shale zone is considered as that part of Mahogany, Zone of the Parachute Creek Member of the Green River Formation containing a near continuous sequence of oil shale of 25 gallon per ton grade or better. Much of the oil shale of this principal zone yields from 25 to 35 gallons per ton on assay and a few thin beds may yield up to 45 to 60 gallons per ton.

Tracts 1, 2 and 3 contain the principal oil shale zone wholly in the subsurface. Tracts 4a, 4b and 5 have the zone at the surface extending into the subsurface. In Tract 4c the principal oil shale zone has been entirely eroded away leaving only low grade shale of marginal value.

Tract	Location (Acres)	Grade of Oil Shale	Elevation at Surface Highest Lowest	Depth to Principal Oil Shale Zone Minimum Maximum	Thickness of Principal Oil Shale Zone (Average)	Estimate of Barrels of Oil in Principal Oil Shale Zone (Gross)	REMARKS
1	Sec. 17 108-24E (200 acres)	25 or more gallons per ton	4895 to 5125	785 to 1060	130	\$2,000,000	
2	Sec. 6, 10, 14, 15 108-24E (480 acres)	as above	5169 to 5035	359 to 1050	125 to 135 (130)	124,800,000	
3	Sec. 2 108-24E (160 acres)	as above	4940 to 5015	720 to 1050	105 to 115 (110)	34,320,000	
4a	Sec. 7 108-24E (250 acres)	as above	4965 to 5040	0 to 270	90 to 110 (100)	49,400,000	Oil shale at surface, eroded from 30 acres.
4b	Sec. 3 108-24E (105 acres)	as above	4980 to 5580	0 to 320	80 to 90 (85)	5,500,000	Oil shale at surface, eroded from 70 acres.
4c	Sec. 24 98-25E (160 acres)	as above	5020 to 5620	not present	-	-	All oil shale in principal zone eroded. Only low grade present.
5	Sec. 8 108-24E (60 acres)	as above	4975 to 5085	0 to 240	(85)	2,560,000	Oil shale at surface, eroded from 45 acres.

#### IMPACT OF DAM AND RESERVOIR ON POTENTIAL FOR OIL SHALE DEVELOPMENT

Building the proposed dam and impoundment of a 12 mile-long reservoir in the canyons of the White River may have unforeseen and unfortunate consequences. Ironically, the reservoir which is to supply the water for the oil shale industry in Utah may make it difficult or impossible to utilize the thickest and richest shale in Utah, notably that located in Tracts Ua and Ub and to a lesser degree in the Sand Wash Project area 8 to 20 miles west.

The important factors are as follows:

##### Location of the Reservoir

The part of the reservoir immediately upstream of the proposed dam, the deepest and widest part, is immediately north and northwest of Tracts Ua and Ub and, in fact, inundates small parts of them. The reservoir is positioned immediately above some of the richest, thickest oil shale in Utah.

Along the White River canyon the impounded waters of the proposed reservoir would be in contact with the entire exposed stratigraphic section from the younger Uinta Formation on the west to the older Wasatch Formation on the east.

##### Contact of Reservoir Waters with Aquifers and Other Water Conduits

The reservoir would be in direct contact with all aquifers in the area including those immediately above, within, and below the Mahogany oil shale zone which is the objective zone for oil shale mining (see Figure 1).

Likewise all bedding planes in the 2,800-foot exposed stratigraphic section will be in contact with the waters of the reservoir.

Since all the formations dip to the west, water lost to these aquifers or bedding planes will be conducted by gravity to fill

whatever void space is available down dip for an unknown distance westward and northwestward from the area of water impoundment. Undoubtedly water will be lost not only through the walls of the reservoir but also through contact of the alluvium on the reservoir floor with the aquifers and bedding planes. The prevailing dip of the formations east to west greatly increases the potential for water being lost at depths well below the base of the dam or any grout curtain that might be created.

##### Contact of Reservoir Waters with Fractures and Joints

The joint pattern of the area, primary, secondary and tertiary, is very extensive and pervasive and probably well developed to depth. Some gilsonite veins extend to more than 1,500 feet. The Little Emma vein has been mined to over 1,000 feet and the Wagonhound vein to 1,300 feet. Joints are notable everywhere in the walls and adjacent to the walls of the White River canyon where the reservoir would be impounded. The joint system in which the Little Emma vein is emplaced crosses the proposed reservoir at the site of the Ignatio Stage Stop. The Wagonhound vein joint system intersects the proposed reservoir near the mouth of Hells Hole Canyon. The course of the White River for about a mile above and below the proposed dam site is about N55°W and appears to be joint-controlled.

It appears very likely that fractures and joints can provide abundant vertical conduits for loss of water from the reservoir into whatever void space is accessible. In combination with the horizontal circulation through aquifers and along bedding planes, loss of water from the reservoir through walls and floor may be unacceptable.

#### Direct Impact on Mining - Oil Shale

Mining of oil shale beneath or near Tracts Ua and Ub would, of course, create void space immediately beneath or adjacent to the floor of the proposed reservoir. The roof of the mined out areas would be only 200 feet or so beneath the reservoir floor or alluvial fill in the east portions of Tract Ub and about 1,000 feet or so in depth in the west portions of Tract Ua.

Extensive water loss from the reservoir into operating mines is a distinct possibility, even to the point of making mining infeasible.

In situ or modified in situ operations in the area of the tracts concerned in this study would also be greatly hampered by an increase in water circulating in joint systems, aquifers, and along bedding planes.

#### OTHER MINERALS

There are no other valuable minerals known to exist on the tracts concerned in this study.

The possibility that water lost from the proposed reservoir through fractures and joints could adversely effect nearby gilsonite operations can not be discounted.

#### SUITABILITY OF PROPOSED DAM SITE

The proposed dam site is in the Uinta Formation, the least competent formation of the stratigraphic section. Its composition - clayey sandstone, loosely cemented calcareous sandstone, calcareous claystone, etc. - will present many problems in the proper anchoring of a large dam. The Uinta Formation stands up fairly well

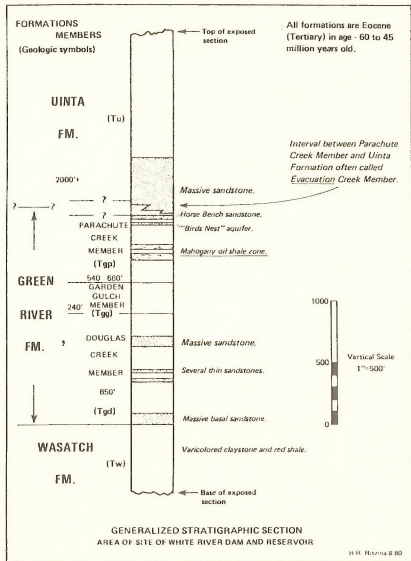
in an arid environment, but with increasing moisture or in contact with water, may weather rapidly and suffer disintegration.

Well developed, pervasive jointing and fracturing and probable loss of water through aquifers and bedding planes beneath and around the dam are factors that raise serious doubts about the suitability of the dam site.

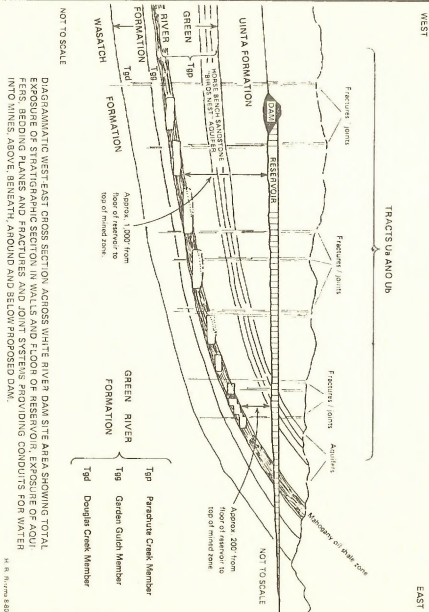
The site of this dam and the reservoir must be studied with great care and detail and alternatives considered.

#### REFERENCES

- Cashion, W. B., 1967, Geology and fuel resources of the Green River Formation southeastern Uinta Basin, Utah and Colorado: U.S. Geological Survey Professional Paper 548.
- \_\_\_\_\_, 1974, Geologic map of the Southam Canyon quadrangle, Uintah County, Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-579.
- \_\_\_\_\_, 1977, Geologic map of the Weaver Ridge quadrangle, Uintah County, Utah and Rio Blanco County, Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF-824.
- \_\_\_\_\_, and G.H. Dixon, 1976, Isopach map and cross section of the Mahogany Zone of the Green River Formation derived principally from geophysical well logs, eastern Uinta Basin, Utah and Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF-797.
- Ritzma, H.R., 1980, Active oil shale operations, eastern Uinta Basin: Utah Geological and Mineral Survey Map 50.
- Stokes, H. L. and J. H. Madsen, Jr., 1961, Geologic map of Utah, northeast quarter: Utah State Land Board and College of Mines and Mineral Industries, University of Utah.
- VTN Colorado, Inc., 1977, Final Environmental Baseline Report, Tracts Ua and Ub, Utah.



- 1 -



## Response Letter 57

- 57.1 The views expressed will be considered in the decision-making process.
- 57.2 Please see the revised Recreation sections in Chapters 3 and 4 in this Final EIS. Also, see Oral Testimony Response 32.
- 57.3 Please see Letter Response 25.10 for discussion of the probable impacts caused by tamarisk and the response of cottonwood.
- 57.4 The Draft EIS indicates on page 113 that the reservoir would not significantly add to the boating resources of the area.
- 57.5 Your concerns were discussed on page 100 of the Draft EIS and also in Chapter 4 of this Final EIS. Also, refer to Letter Responses 5.2, 33.4, and Oral Testimony Response 11.
- 57.6 See Letter Responses 15.2, 25.13, the revised Geology sections of Chapters 2, 3, and 4, and Appendix 12 in this Final EIS.

## Comment Letter 58

February 5, 1981

1792  
WE  
0290

Mr. Lynn Leishman  
Area Manager  
Bureau of Land Management  
150 East 900 North  
Richfield, Utah 84701

Dear Mr. Leishman,

I appreciate the opportunity to comment on the White River  
dam project.

- 58.1 The EIS contains considerable information and represents substantial effort by a number of people. Unfortunately, the most important environmental document, the USFWS biological report, is absent. Since the BLM considers the USFWS report pivotal in regard to the final decision, it appears that the release of the EIS was premature. It also appears that the BLM, by announcing a tentative decision based upon the results of a study not yet completed, is attempting to dump a politically explosive situation in the lap of the USFWS, and ultimately in that of the Endangered Species Act.

I suspect that the BLM recognizes the current draft EIS for what it is: a well-prepared preliminary report, but woefully deficient as a document for public analysis, or for agency decision-making.

cc. Utah Wilderness Association  
American Wilderness Alliance

Sincerely,  
*Kim Crumbo*  
Kim Crumbo  
571 West 200 North  
Logan, Utah 84301

## Response Letter 58

- 58.1 The FWS Biological Opinion is included in this Final EIS in Appendix 4. Concern for the endangered species, not political self interest, is the reason for the delay between Draft and Final EISs.  
As stated on page 43 of the Draft EIS, "The new FWS information and the public comments on this Draft EIS may or may not lead to the selection of a different agency-preferred alternative than now identified by BLM."

## Comment Letter 59

3695 F Rd  
Palisade, Colo. 81526  
Feb. 9, 1981

Dear Sirs,

I want to protest your plans for a White River dam and urge that you adopt alternative #2 in the EIS: No Action.

I am against the construction of a dam on the White River for the following reasons:

- 59.1 1. No action should be taken concerning this river until an agreement is reached with Colorado which would determine each States share of the water in the White. It would be highly preferable to develop a White River Compact that would establish firm allocations of the water in the White to the various entities concerned with that water.
- 59.2 2. I do not feel that there has been sufficient attention given to the alternatives to the dam as a means of providing water for oil shale and tar sands development. Ground water, direct diversion from nearby storage areas and the use of pipelines have not been fully examined.
- 59.3 3. If the oil shale and tar sand industry develops as you are projecting, then the firms involved should be required to obtain the water they need instead of governmental agencies providing it for them.
- 59.4 4. The White because its waters have not been officially been allocated, provides a unique opportunity to develop a comprehensive system of water use that would encompass all users in a plan of water conservation. This plan would be mutually beneficial to the farmers and ranchers, industries, municipalities and governmental entities involved.
- 59.5 Again I urge you to take no action concerning a dam on the White River until the above concerns have been resolved.

Sincerely,

*Shirley Hamann*

## Response Letter 59

59.1 The views expressed will be considered in the decision-making process. See Oral Testimony Response 6 and Letter Responses 37.3 and 42.2.

59.2 The availability and use of groundwater is treated in more detail by Letter Responses 29.3, 27.17, 27.28, and 40.3. The presentation of groundwater data is, at this time, limited by the amount of available information.

Three of the five alternatives analyzed in this EIS would utilize pipelines extensively. Alternative 3 would use the potential Hell's Hole Canyon Reservoir and Alternatives 4 and 5 would pipe water released from Flaming Gorge. Therefore, this EIS does analyze alternatives using pipelines and nearby storage areas (existing and proposed) which are reasonable and could be selected.

59.3 Oil shale/tar sand companies would purchase water from the Utah Division of Water Resources. It would not be freely given to them.

59.4 A plan, such as you suggest, could be useful. However, BLM has no jurisdiction or authority to devise, implement, and enforce this kind of project for White River waters. See Letter Responses 37.3, 42.2, and Oral Testimony Response 6.

59.5 The views expressed will be considered in the decision-making process.

## Comment Letter 60

### UTE INDIAN TRIBE

11 February 1981



Mr. Lloyd H. Ferguson  
District Manager  
Bureau of Land Management  
110 South 500 East  
Vernal, Utah 84078

Dear Mr. Ferguson:

RE: Comments on DEIS of the White River Gsn Project

We would like to advise you that we are in full agreement with the comments made by the Superintendent of the Uintah and Ouray Agency in regards to the DEIS of the White River Gsn Project.

Inasmuch as we are in full agreement with these comments, we are enclosing a copy of the comments for your review, as they cover the same items of concern.

We do appreciate the opportunity to review the Draft and provide our input.

Sincerely,

Jason Cuch  
Director of Resources

in  
attachment

FEDERAL CHARTERED LODGE  
UNITED AND OURAY AGENCY  
BUREAU OF LAND MANAGEMENT  
110 South 500 East  
Vernal, Utah 84078

60.1

- 60.1 The position of the Ute Indian Tribe is noted and will be considered in the decision-making process.

The comments received from the Superintendent of the Uintah and Ouray Agency, Bureau of Indian Affairs, are included as Comment Letter 49 in this Final EIS.

10 Feb 1981

579 12th Ave

Salt Lake City, UT 84103

District Manager  
Vernal District Office  
BLM

170 S. 500 E Vernal, Utah

Dear Sir:

- 61.1 We are writing to urge that the White River Dam not be constructed, at least at this time. We feel that the dam is not necessary (if it were, the US Water & Power Service would certainly be pushing the project).

- 61.2 The adverse geological setting (i.e. jointing of rock & probable loss of much water & the very heavy silt load of the river) suggests this is not a wise place to build a dam. In addition, a prime recreational area (for <sup>some</sup> flat water canoeing especially) & prime wildlife habitat would be destroyed & the endangered Colorado Squawfish would be further threatened.

Yours truly,  
Laural Casjens  
Laural Casjens  
~~Carlton DeTar~~  
Carlton DeTar

## Response Letter 61

61.1 The views expressed will be considered in the decision-making process. The Bureau of Reclamation is not the only government agency that constructs dams. In addition, the Army Corps of Engineers, Soil Conservation Service, State Division of Water Resources, and others are involved in water projects. The Bureau of Reclamation has studied a water project on the White River, although this project has not been its priority project to date. See Letter Response 46.2.

61.2 See Letter Responses 15.2, 25.13, 27.37, 64.14, and Appendix 12 concerning dam site integrity. It is acknowledged that siltation and impacts to recreational free-flowing river status would result from this project. The FWS has recently conducted an analysis of endangered fish species in the Upper Colorado River Basin drainages. The FWS Biological Opinion is included in this Final EIS as Appendix 4.

## Comment Letter 62

February 8, 1981  
 Mr. Woodall  
 P.O. Box 492  
 St. George, Utah  
 84770

Lloyd Ferguson  
 District Manager  
 Vernal District- SLH

Sir,

I would like offer public comment on the White River Dam proposal. I hope my comments will be counted in spite of their late arrival.

62.1

While working in the Price area I went canoeing and rafting down the White River and at that time there was mention of the dam. I have kept an ear open for news and now you are doing your study on alternatives to the dam (including the dam). From the start, I am opposed to the proposed dam and any alternative that would include side canyons of the White River. I am not opposed to dams per se, however I am opposed to dams that would needlessly destroy the recreation potential of a river. I understand that an alternative for a water pipeline exists. It has been labeled as the most costly, but perhaps a cost/benefit analysis considering the worth of free-flowing river recreation and wetlands habitat might show the dam proposals as being the most costly.

On the river I thrilled to crash through waves caused by rapids and enjoyed watching a Canadian Goose and her goslings searching for food as we floated by. In the evening we listened to beaver slap their tails while our dinner cooked. These experiences are the kind that more and more people will be seeking as the energy related population occurs in Utah and Colorado. In that light the value of an un-dammed river grows perceptibly.

Thank You

Steve Hanson

## Response Letter 62

- 62.1 The views expressed will be considered in the decision-making process.

## Comment Letter 63

**BRIAN BEARD**  
2180 East 900 South  
Salt Lake City, Utah 84108

February 10, 1981  
(801) 583-7261

District Manager  
Vernal District Office  
Bureau of Land Management  
170 South 900 East  
Vernal, Utah 84078

RE: The Proposed White River Dam Project

Dear Sir:

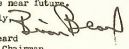
You are undoubtedly aware that the Utah Chapter Sierra Club is concerned about the environmental impacts of the proposed White River Dam Project. Your assistance in obtaining the following information would be appreciated:

- 63.1 1. Page seven of the Draft Environmental Statement reads in part:
- "The State of Utah requested on August 13, 1980 that BLM extend the Section 7 consultation period required under the Endangered Species Act on this project."
- Please send a copy of the August 13 1980 letter noted above, and any additional information which will help in understanding this situation.
2. Page 163 (Appendix J) of the Draft Environmental Statement mentions the Utah Division of Water Resources' White River Dam Project Proposed Action Plan, dated August 1979
- Please send a copy of the report underlined above.
3. Page 163 of the Draft Environmental Statement also mentions an addendum to the report noted above. The addendum is dated the 16th of May, 1980. Please send a copy of this addendum.
- 63.2 4. Information on how the BLM is reviewing safety requirements of the White River Dam and incorporating the safety factor into the decision making process would be appreciated.

If I can provide clarification on the above requests, please feel free to write or phone.

I look forward to hearing from your office in the near future.

Sincerely,

  
Brian Beard  
Chapter Chairman  
Utah Chapter Sierra Club

## Response Letter 63

- 63.1 The requested information was mailed to Mr. Beard on February 26, 1981.
- 63.2 Safety requirements of project structures is the ultimate responsibility of the State Engineer, working with the design firm, Bingham Engineering. In addition, the U.S. Army Corps of Engineers will also conduct a dam integrity analysis in conjunction with the granting of a 404 permit.

## Comment Letter 64



### United States Department of the Interior

NATIONAL PARK SERVICE  
 ROCKY MOUNTAIN REGIONAL OFFICE  
 655 Parker Street  
 P.O. Box 22507  
 Denver, Colorado 80225

IN REPLY REFER TO:  
 L7619 (RMR)PC

FEB 13 1981

#### Memorandum

To: District Manager, Vernal District Office, Bureau of Land Management, Vernal, Utah

From: Associate Regional Director, Planning and Resource Preservation, Rocky Mountain Regional Office

Subject: Review of Draft White River Dam Project Environmental Impact Statement, Utah (ER 80/74)

Enclosed are National Park Service comments on the subject environmental impact statement. Basically we are concerned that enough thought has been given as to the actual need for this project, its cumulative effects with other projects, and the effect on water quantity and quality in the Colorado River Basin.

*Richard A. Strait*  
 Richard A. Strait

Enclosure

NATIONAL PARK SERVICE COMMENTS ON WHITE RIVER DAM DEIS

General

- 64.1 The water needs estimates, central to project justification, appear "soft" or not fully substantiated. The National Park Service believes the need for the project should be re-evaluated considering:
- potential shifts in Government policy regarding loan guarantees for oil shale development.
  - environmental impacts of the project on water resources in general and endangered fish in particular.
  - shifts on consumer demands and more advanced technologies for other energy resources which could render oil shale development less attractive.
- 64.2 Most environmental impact statements dealing with dams use an analysis period of at least 100 years; if this one had done so, it would have dealt with 18 years in which the dam was completely filled with sediment and effective water yield would then be the same as for the White River direct pumping alternative. It would also note diminished yield from the dam beginning soon after the sediment storage pool was filled and, in the later periods, aggradation upstream from the head of the lake as the channel establishes the slope necessary to transfer sediment leads to the spillway of the dam. Once that slope was established, any agricultural changes which had been based on diversion of clear water below the dam would be imperilled. Since it seems clear that this project would alter the White River for millennia in return for about 60 years' use of the water, we question the suitability of cutting off the analysis period at a point when some of the major impacts of the dam will be beginning--particularly as those impacts will be felt for a period better measured in the geologic than in the human time frame.
- 64.3 We believe the draft environmental statement (DES) is seriously deficient due to the absence of a Biological Opinion from US Fish and Wildlife Service on endangered species.
- 64.4 It further seems inappropriate to deal so lightly with cumulative impacts on the endangered species, especially with the plethora of projects proposed on the White, Duchesne and Yampa Rivers. The cumulative impacts of even a few projects could result in the extirpation of the three endangered fish species throughout the Upper Colorado River Basin (which presently constitutes most of their remaining ranges). We suggest that an analysis be made which includes all potential upstream developments. For understanding in that NEPA is not satisfied by a statement that upstream development cannot be discussed. We submit that enough is known about basin-wide development plans to produce an estimate of the synergistic effects of this project when combined with others currently planned.
- 64.5 Cumulative impacts on other resources should also be examined in greater detail.

- 64.6 Alternatives 1, 3, 4 and 5 note an increase in salinity of 3.4 mg/l at Imperial Dam. The increased cost of desalination (\$340,000 /mg/l as noted in the DES) should be internalized in estimating project costs.
- 64.7 Environmental impacts need to be more fully quantified, particularly as they relate to riparian habitats, river morphology, water quality, and endangered and non-endangered wildlife species.
- Specific
- 64.8 Sediment Infilling of Reservoir: What problems have occurred in other areas when reservoirs have filled with sediment? What dangers, if any, arise in these situations?
- 64.9 Revegetation: How easy or difficult is revegetation in an arid environment? What reseeded problems have occurred with similar projects in similar areas?
- P. 103, Column 1 notes that reseeded will be difficult in "certain areas." How large are these areas? What erosion problems will occur in areas where an estimated 20 years are necessary for revegetation?
- 64.10 Recreation: With the anoxic water, turbidity, hydrogen sulfide gas and no emergent vegetation, we question whether a reservoir fishery sufficient to sustain significant recreation can be developed.
- 64.11 The Natural Oil Seep: What is the local structural geology of the natural seep? If plugged, will it just seep later at some other point? Are there other oil pockets just below the ground surface? If so, will they seep as water inundates the area?
- 64.12 Introduction of Oil Shale: Pages 99-101 discussed the inundation of oil shale and potential problems associated with leaching. The potential water quality problems resulting from that leaching may not be mitigable once the dam is in place. In any event, we are unable to understand what "appropriate remedial action" may be, and would therefore appreciate an expanded discussion of both the potential health and water quality problems and the remedial actions mentioned. For instance, the statement mentions the presence of heavy metals. These metals have been implicated in the pollution of the Rio Grande and the contamination of fish, wildlife, and livestock far downstream from the source of pollution on the Red River in northern New Mexico. Since such a condition here could extend down much of the upper Colorado River System, we believe a more complete discussion is appropriate.
- 64.13 Hell's Hole Dam: It is difficult to assess the feasibility of the Hell's Hole Dam when no investigations have been made of the subsurface geology.

- 64.14 Regional Jointing: As the isostatic loading is greatly increased as the reservoir fills, will movement occur along joints? Will water travel along these joints and lubricate them?
- 64.15 Hydrogen Sulfide: What pH changes can be expected in the reservoir due to the presence of hydrogen sulfide? How will the pH of released water compare to the present river pH? What effects might be expected on downstream flora and fauna?

Although this DES is well written, the National Park Service believes that the absence of certain critical information on endangered species and the project's relationship with other planned developments renders it inadequate as a basis for deciding which of the alternatives is preferable.



IN REPLY REFER TO:

L7619 (RHR)PC

## United States Department of the Interior

NATIONAL PARK SERVICE  
ROCKY MOUNTAIN REGIONAL OFFICE

655 Parfet Street  
P.O. Box 52287  
Denver, Colorado 80225

MAR 2 1981

### Memorandum

To: District Manager, Vernal District Office, Bureau of Land Management, Vernal, Utah

From: Associate Regional Director, Planning and Resource Preservation, Rocky Mountain Region

Subject: Review of White River Dam Project Draft Environmental Impact Statement, Utah (ER 80/74)

We have another comment to add to our subject comments submitted to you on February 10, 1981.

64.16

The Superintendent, Dinosaur National Monument, points out that the White River Dam Draft Environmental Statement states that the Desert Generation and Transmission Cooperative's preferred alternative for a water source for the Moon Lake power plant project is the proposed White River Dam. However, the Draft Environmental Impact Statement for the Moon Lake power plant project states that the applicant's preferred alternative for water source is from the Green River.

This disparity must be rectified. If the Moon Lake Draft Environmental Impact Statement is correct we believe the "head" for the White River Dam is further obviated.

Richard A. Strait

- 64.1 See the revised Chapter 1, Purpose and Need section, of this Final EIS. See also Letter Responses 47.1, 56.1, and 56.9. The FWS has recently conducted an analysis of endangered fish species in the Upper Colorado River Basin drainages. The FWS Biological Opinion is included in this Final EIS as Appendix 4.
- 64.2 Please see the analysis of impacts on page 100 of the Draft EIS, Letter Responses 5.2, 33.4, and Oral Testimony Response 8 for other information.
- 64.3 A Biological Opinion could have been given with available information; however, FWS, the Utah Division of Natural Resources, and BLM agreed that additional studies and consultation should be completed concerning the endangered fish species. These studies were completed in the fall of 1981 and the Biological Opinion is included in this Final EIS as Appendix 4.
- 64.4 See Letter Responses 32.1, 37.3, and 64.1.
- 64.5 The White River Dam Draft EIS Cumulative Impacts section (page 142 of the Draft EIS) synthesizes known environmental consequences from other regional projects. Primary and secondary impacts of specific oil shale and tar sand projects in the area will be analyzed in the forthcoming Uinta Basin Synfuels EIS. This Final EIS further considers cumulative regional impacts.
- The FWS has considered the historical cumulative effects on endangered fish species in the Upper Colorado River Basin drainages and will further consider such effects in consultation on synfuels projects. The Biological Opinion for the White River Dam is included in this Final EIS as Appendix 4.
- For cumulative recreational impacts, see the revised Recreation section in Chapter 4.
- 64.6 The revised salinity figure is 4.1 mg/L. There appear to be many impacts resulting from changes in water salinity of the Colorado River. The problem is that the well-being of some users of the river conflicts with the well-being of other users. The estimates in the Draft EIS are intended to be used as one measure in evaluating increased salinity effects resulting from the White River Dam and Reservoir. The current cost estimates used in this Final EIS are \$450,000 per mg/L.
- The costs reflect detrimental impacts on water uses such as decreased productivity and/or increased production costs for both agriculture and industry. In household uses, the detriments include reduced life of water-related equipment (dishwashers, washing machines, etc.) and lower palatability of drinking water. There is no generally accepted method to internalize these impact costs into project costs, but they are given in this EIS as impacts resulting from the project.
- 64.7 As discussed on page 103 of the Draft EIS, Unavoidable Adverse Impacts, about 995 acres of riparian vegetation would be occupied by the dam and reservoir and about 4,575 acres of floodplain/riparian vegetation would be altered below the dam by changes in the river's flow regime. For further analyses of impacts to riparian habitat, please see Letter Responses 4.9, 4.10, 5.9, 25.10, and Oral Testimony Response 30.

- 64.7 (cont.) Water quality was discussed in detail on pages 95 to 98 of the Draft EIS and the references used to develop this section were taken from the Final Environmental Baseline Report (VIN Colorado, Inc., 1977) where complete water quality analysis is given. Analysis shows that the dam and reservoir would not create much change in water quality except as noted on page 98 of the Draft EIS and also in Chapter 4 in this Final EIS.
- Your concerns about wildlife species are extensively covered in the Draft EIS on pages 103 to 112 and repeated in Chapter 4 in this Final EIS. See Letter Responses 4.1 and 5.11 for more information.
- 64.8 Please refer to Oral Testimony Response 8. In addition, BLM is not aware of any particular dangers involved with the reservoir filling with sediments. The hydroelectric power plant could remain functional by dredging and clearing around the penstock intake.
- 64.9 Revegetation in this area is difficult because of low precipitation, alkaline soils, and competition from annual weeds and animals. The survival of grasses and shrubs drill seeded by contractors on disturbed sites in this area has, in most cases, been nil (McKell, 1979). Successful revegetation of disturbed sites in this area is labor and time intensive, and costs must be measured against the resulting benefits. The "certain areas" referred to in this EIS can probably not be delineated until problems with them develop. It can only be assumed that certain areas would present more problems than others.
- Approximately 1,200 areas would be disturbed. Because the disturbed areas would be scattered, any erosion would be (even if severe) localized and insignificant on an area-wide basis.
- 64.10 On page 112 of the Draft EIS, it states "Lanarrea (1980) indicated the warm water fishery would probably be of low quality, thus not adding greatly to the recreation resource."
- 64.11 See Letter Response 4.5.
- 64.12 According to the USOI, Geological Survey (1981), the inundation of oil shale and probable resultant leaching would not be a problem except initially when the dam was in place and the reservoir was filled for the first year or two. The leachate problem would be from salts and not heavy metals or trace elements. The trace elements are bonded tightly to the sediment (clay) particles and are released only under certain conditions. These sediments have been produced naturally from erosion of the Mahogany zone and other formations during the development of the river system in geologic time.
- The amount and kind of contaminants (trace elements) that could be released is not completely known at present. The sediment conditions have existed for some time and the condition you are concerned about probably already exists in much of the Upper Colorado River system. See Letter Responses 22.3, 27.4, 27.24, and 27.37 for information about oil shale inundation and water quality resulting from leaching.
- 64.13 Chapters 2 and 3 in this Final EIS describe the geology of the affected environment and Figure 3-1 provides the geologic cross-section, superimposed with Hell's Hole Canyon. See also Letter Response 24.22.

## Comment Letter 65

64.14 The exposed Uinta Formation can be well jointed to various depths, with high localized permeabilities. However, drilling and water pressure testing at the dam site indicated that these joints typically become much tighter approximately 10 to 60 feet below the bedrock surface. Some joints capable of taking water were encountered below 60 feet. Occasionally major joints will extend for vertical distances of several hundred feet, but the evidence seems to indicate that these are not common in the project area. The vertical permeability of groundwater is not considered substantial (Bingham Engineering, 1981a). See Letter Responses 25.13, 27.37, and Appendix 12 of this Final EIS.

64.15 The projected average pH of the reservoir is expected to be 8.3 (Lamarra, 1980) with variations at the tailwater 7.2 to 7.4, upper layer 7.8 to 8.9, and bottom layer 4.0 to 7.0 (Wingett, 1981). In general, the relatively high average pH and the oxidation caused by the mixing and two seasonal turnovers of the limnologic layers would reduce the anoxic conditions necessary for hydrogen sulfide production in quantities sufficient enough to lower pH. This is especially true downstream, where the substrate is basic and aeration is accelerated. Therefore, no pH-related effects on downstream flora or fauna are expected.

64.16 Deseret Generation and Transmission Cooperative has decided to obtain the Bonanza Power Plant water supply via pipeline from the Green River. The Bonanza Power Plant (formerly call Moon Lake Power Plant) has been deleted from the list of subscribers to White River Dam water. Please see the revised Chapter 1, Purpose and Need section, in this Final EIS for the updated list of potential water users.



United States  
Department  
of Agriculture

Rural  
Electrification  
Administration

Washington  
D.C.  
20250

Mr. Donald L. Pendleton, District Manager  
Vernal District Office  
Bureau of Land Management  
170 S. 500 East  
Vernal, Utah 84073

Dear Mr. Pendleton:

The Rural Electrification Administration has reviewed the Draft Environmental Impact Statement of the White River Dam Project prepared by the Bureau of Land Management. In general, this is a thorough, concise document. There are, however, several issues that were not completely addressed. These are detailed in numbers 2, 4 and 10 of the enclosed comments. The remaining comments discuss relatively minor points.

For further clarification you may wish to contact Ms. Linda Lyon at (202) 847-7447 or FTS 847-7447.

Sincerely,

*Richard M. Rimmer for Joseph R. Rimmer*

JOSEPH R. RIMMER  
Director  
Environmental and Energy  
Requirements Division

Enclosure

Rural Electrification Administration  
Comments to Bureau of Land Management  
Draft Environmental Impact Statement  
White River Dam Project

- 65.1 1. Page 2 - Alternatives  
We suggest that the other dam sites along the White River that were investigated be located on suitable maps. The screening process should be summarized, giving major selection factors, and all pertinent documents should be cited.
- 65.2 2. Page 3 - Purpose and Need  
The principal criterion for selecting the proposed project and alternatives was the capability to provide 70,000 acre-feet of water per year. Therefore, the derivation of this figure should be better documented.
- 65.3 The citation for the White River Oil Shale Project (WRSP) development plan should be given. Is the estimated water requirement of 13,000-26,000 acre-feet per year the range for all feasible retorting systems? The factors used to calculate this range should be given. This should include a breakdown of the water consumption for the principal processing steps that require significant amounts of water. If more than one retorting system is being considered, then this information should be provided for each system. Similarly, what factors were considered when calculating the estimated water need for the TUSCO Corporation oil shale development?
- 65.4 An issue identified during the scoping process was whether water use technology could be applied to decrease the amount of water development requires (Page 8). This issue was not addressed in the Draft Environmental Impact Statement (DEIS) and should be considered.
- 65.5 The inclusion of the 18,000 acre-feet of water per year for the Moon Lake Power Plant (MLPP) in determining the project size (i.e., the number of acre-feet of water per year) should be reconsidered. MLPP has senior water rights on the Green River ("Moon Lake Power Plant Project - Units 1 and 2, Draft Environmental Impact Statement", USDA/BLM and USDI/BLM, January 16, 1980). Thus, the MLPP project will not be dependent on the White River Dam Project (WRSP) to meet its water requirements.
- 65.6 3. Page 6 Figure 1-1  
If the map is to be redone for another purpose, the town of Bonanza should be identified.
- 65.7 4. Page 42 - Figure 1-1, Land Use  
The Chairman of the Council of Environmental Quality's Memorandum for Heads of Agencies dated August 13, 1980 ("Prize and Unique Agricultural Lands and the National Environmental Policy Act") requires that federal agencies evaluate the impact their proposed actions may have on prime or unique agricultural land. The WRSP will cause irreversible loss of rangeland from flooding and possibly affect some land by construction activities including access roads and transmission lines. The DEIS sections on land use (Pages

- 65.7 (cont.) 42, 73-74, 114-115) do not address prime rangelands. Will any prime rangeland be affected by the WRSP? If so, how will any adverse impacts be mitigated?
- 65.8 5. Page 53 - Water Quality  
"TIC" should be spelled out the first time it is used. Also, TIC should be included on the list of abbreviations (Page 200).
- 65.9 6. Page 53 - Water Quality  
Do the characteristics of this groundwater render it unsuitable for all the major consumptive uses the WRSP would serve? If so, then briefly explain why. If not, then describe the potential applications of groundwater for projects in proximity to the WRSP.
- 65.10 7. Page 55 - Wetlands  
The source of information regarding wetlands location should be given.
- 65.11 8. Page 107 - Birds, Mitigation  
The text ought to state that as a mitigative measure the transmission line planning will follow the guidelines suggested in the Rural Electrification Administration Bulletin 61-10, "Protection of Bald Eagles and Golden Eagles from Power Lines" or a similar publication. A copy of this bulletin is enclosed.
- 65.12 9. Page 114 - Visual Resources, Mitigation  
There should be a statement that U.S. Department of Interior/U.S. Department of Agriculture "Environmental Criteria for Electrical Transmission Systems" will be followed.
- 65.13 10. Page 142 - Cumulative Impacts  
The cumulative impacts were discussed primarily with respect to the effects to water quantity. The cumulative effects to water quality resulting from the consumptive use of water should also be addressed. Potential areas of concern include thermal effluent from MLPP, disposal of processing water from oil shale facilities and domestic wastewater treatment. The availability of water from the WRSP will encourage development, and might entail some irreversible and irretrievable environmental impacts. Therefore the cumulative effects of related projects to water quality in the Colorado River Basin system should be given serious consideration.

## Response Letter 65

- 65.1 See Letter Response 25.2.
- 65.2 Thank you for your comment. A new list of proposed users is included in the revised Chapter 1, Purpose and Need section, of this Final EIS. See Letter Response 25.4 for more information.
- 65.3 The reference is the White River Dam Project, Proposed Action Plan and amendments (Utah Division of Water Resources, 1979). The State of Utah has identified 350,000 acre-feet per year as the unallocated share of Upper Colorado River Basin flow for energy development, and the White River Dam would utilize this entitlement.  
See Chapter 1, Purpose and Need section, for energy company projections and requests for water. See also Letter Response 22.1.
- 65.4 See Letter Response 22.1.
- 65.5 The Bonanza Power Plant Project (formerly called the Moon Lake Power Plant) is no longer a potential user of proposed reservoir waters and has been deleted from the list of users in Chapter 1.
- 65.6 Figure 1-1 has been revised as requested.
- 65.7 The USDA State Land Use Committee Chairman was contacted, as advised in the memo you refer to. At present no guidelines or criteria have been established to identify "prime rangelands".
- 65.8 TDS (total dissolved solids) has been added to the Glossary of this Final EIS.
- 65.9 See Letter Responses 25.3, 27.16, 27.17, 27.28, 27.29, 27.35, and 40.3 for groundwater information.
- 65.10 The river was flown by BIO-WEST and riparian and wetland areas were delineated on 7 1/2" USGS maps. These delineations were then planimetric to derive the acreages reflected in this EIS. The White River in Utah was studied from aircraft, ground surveys, and river floating on several occasions to obtain observations concerning flora, fauna, and terrestrial characteristics.
- 65.11 Although no mention is made of any particular bulletins, the text does state that transmission lines would be constructed to prevent any electrocution of raptors.
- 65.12 The guidebook referenced in the comment letter will be considered if the White River Dam is constructed.
- 65.13 The cumulative impacts are discussed in the Draft EIS on page 142, column 1, paragraph 4. This section briefly discusses an overall cumulative impact of increased salt loads of more than 19 mg/l to the Colorado River system. Concerns about thermal effluent from the Bonanza Power Plant Project were not considered significant because the water used for the Bonanza Power Plant would be consumptive. Disposal of processing water from oil shale facilities and domestic waste water treatments were not considered as significant issues because waste water would not be returned to the river. The major cumulative impacts would result from water withdrawals from the total river system and the resultant salt load increases.

## Comment Letter 66

V. L. FUGITT  
3754 BARBARA WAY  
S. L. C. UT 84117

DISTRICT MANAGER  
VERNAL DISTRICT OFFICE  
B. L. M.  
170 So. 500 S.  
VERNAL UT. 84078

Dear Sir :

- 66.1 Regarding the White River Dam Project --- as a citizen concerned with the use of Utah's resources for the greatest number of people over the longest possible time, I would like to make the following suggestions concerning this project:

Alternative # 2 No Action - deny permits for project construction

until:

- 1) Oil shale technology is further advanced & it is indeed proven this technology will work & is feasible -
- 2) Oil shale industry water needs are actually determined -
- 3) A master (interstate) plan for the White River is developed
- 4) Alternate dam sites are investigated
- 5) The environmental impact of this project is studied to determine the long term benefits & destruction

Thank you  
Victoria Fugitt

## Response Letter 66

- 66.1 For information about oil shale development water needs, see the revised Chapter 1, Purpose and Need section, in this Final EIS. Concerning your question on an interstate master plan for the White River, see Letter Responses 37.3, 42.2, and Oral Testimony Response 6. Five dam sites were considered; refer to Letter Response 25.2. The purpose of this EIS is to consider all impacts including those of a long-term nature.

## Comment Letter 67



### UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII

1860 LINCOLN STREET  
DENVER, COLORADO 80295

FEB 10 1981

Ref: 8W-EE

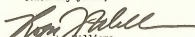
Lloyd Ferguson  
District Manager  
Vernal District Office  
Bureau of Land Management  
170 S. 500 East  
Vernal, Utah 84078

Dear Mr. Ferguson:

- 67.1 The Region VIII Office of the Environmental Protection Agency has reviewed the White River Dam Project Draft EIS and has concerns as to the consequences of this proposal. Based on our review of the draft impact statement and other information available to us, we believe that there are other options that have less adverse impact on environmental values.
- The evidence suggests there are alternative sources of water that can be developed for the oil shale and coal industry with far less effects upon the environment and at reasonable cost. By using one or a combination of industry-funded direct withdrawals from the White or the Green River, the eastern Utah energy industry could receive adequate supply at reasonable costs without most of the environmental damage of this proposal. Further, it may be possible to develop saline sources, such as Bitter Creek or groundwater, in order to promote the policy adopted by Utah and the Colorado River Salinity Forum of promoting the use of saline or brackish water for industrial purposes.
- 67.2 The most serious environmental problems with the White River Dam include high sedimentation rates, rapid eutrophication, increases in Colorado River salinity not only due to water depletion and evaporation but aggravated by leachates from the inundated material, and other adverse water quality changes including heavy metal dissolution, and possible toxic hydrocarbons from gilsonite seeps, as well as loss of valuable riparian wildlife habitat.
- 67.3 The White River Basin lacks the planning necessary to coordinate water development activities in Colorado and Utah. Until options for upper basin development are better defined and an interstate agreement established, it is not possible to determine the effect or need for this reservoir. An agreement between Colorado and Utah is needed which would guarantee flow to Utah and the Ute Tribe. This would also reduce the risk associated with direct flow alternatives. We recommend that the Bureau of Land Management initiate discussion with the Utah Division of Water Resources and the Colorado Water Conservation Board to secure such an agreement before any decision is made with regard to additional impoundments or major withdrawals of the White River.
- In accordance with our policy of categorizing our EIS comment letters, we have classified these comments as EU-2. This indicates that we find the project to be environmentally unsatisfactory and the impact statement to be deficient in information. Our reasons for this finding are explained in more detail in the attached comments.

Thank you for providing our agency the opportunity to review and comment on this impact statement. We would appreciate an opportunity to discuss our comments in detail with you and assist you in appropriate revisions to the environmental impact statement. You may contact Weston Wilson on my staff (FTS 327-4831) if you have any questions.

Sincerely yours,

  
Roger J. Williams  
Regional Administrator

Enclosure

cc: Governor Matheson  
Governor Lamm  
Dan Lawrence, Utah Division of Water Resources  
Bill McDonald, Colorado Water Conservation Board

Detailed Comments on the White River Dam Draft EIS

Prepared by Region VIII Office, Environmental Protection Agency

EUTROPHICATION:

- 67.4 An attempt could have been made to determine the origin of nutrient loading sources, either point or non-point. Productivity was said to be nitrogen and light limited, which raises the possibility of toxic blue-green algal blooms. This possibility is increased during turnover when increased amounts of phosphorus will be available, (page 38). Future upstream impoundments of the White River would decrease the sediment load, increasing the likelihood of algal blooms, especially blue-greens, if nitrogen becomes the limiting factor on productivity.
- 67.5 Non-biological contaminants are an additional threat to reservoir uses. The unusually high levels of trace elements (page 53) occurring in the White River might be increased due to oil shale leachates. This raises the possibility of use limitations due to toxics and/or carcinogens if concentrations are high within the reservoir. An estimate of concentrations of these toxics in the reservoir could be made to determine if this concern is valid.
- 67.6 Within the reservoir itself, a cold water fishery could not be established due to anoxic conditions existing (at times) in the lower portion, (page 38). References to a warm water fishery indicate that if any were established, it would probably be poor quality. Chances of this fishery being successful will be reduced further if historic temperature regimes are required downstream thereby decreasing the warm water component of the reservoir. Proposed mitigation of present recreational opportunities through a trade-off, (canoeing stream vs. boating and fishing) does not appear justified. The comparison should be between the low quality fishing and boating activities in a eutrophic lake, as compared to canoeing and rafting in a pristine stream of wilderness character.
- TEMPERATURE:
- 67.7 Release of cold water (50 degrees Fahrenheit) from the reservoir would adversely affect the native biota downstream, seriously impacting the Colorado Squawfish, (see Endangered Species discussion). Changing the outlet design could permit historical temperature releases partially mitigating this loss of the native ecosystem. If requested by the U.S. Fish and Wildlife Service, the Corps of Engineers could require maintenance of historical temperature regimes as a 404 permit condition.
- DISSOLVED OXYGEN:
- 67.8 Seasonal anoxic conditions within the reservoir itself would hasten eutrophication and decrease its aesthetic values (i.e. nutrient cycling,  $\frac{1}{2}$  S gas production). As indicated in the draft EIS, DO concentrations should not present any problems downstream during normal operations.

ENDANGERED SPECIES:

67.9

The endangered species of the Green River drainage (Colorado Squawfish-*Ptychocheilus lucius*, Humpback Chub-*Gila cypha*, and Bonytail Chub-*Gila elegans*) have adapted to the swift flowing, warm waters of the Colorado River system. While we defer to the expertise of the U.S. Fish and Wildlife Service, EPA believes the lack of sediment and change in flow rates and temperature resulting from this dam would adversely affect the physical habitat of these species (page 108). This effect has previously been observed when the closure of Flaming Gorge Reservoir eliminated these species of native fish in the Green River sixty-five miles below the dam, to the confluence of the Yampa. (Holden, P.B. and C.B. Stalnaker, 1975)

Spawning in these species is triggered by increasing water temperatures and flow rates. Unless these are reached, spawning will not occur. The Colorado Squawfish begins to spawn at water temperatures of 21 degrees Celsius. They spawn in shallow sediment-laden waters and the fertilized egg mass adheres to the bottom. Stirring of gravel readily dislodges the eggs. (Hoover, R.L. and D.C. Langlois, 1977). Armoring of the White River below the dam would drastically affect this habitat and could seriously decrease spawning success of the Colorado Squawfish.

Setting up historical temperature regimes may not be the complete answer to preserving this habitat. If these endangered fish do manage to spawn (due to maintenance of historical water temperatures) but do so in a scoured stream, this would result in their eggs being washed downstream. Alternatives to the White River Dam, such as pumping water from the White or Green Rivers, preclude this drastic change in habitat. Sediment loads and temperatures would remain close to historic levels if the water supply were directly diverted without storage, thereby preserving the endangered species habitat.

WETLANDS:

67.10

The riparian wetlands in the project area are valuable and significant wildlife habitat, not only due to the scarcity of similar habitat but also related to the large differences between the wetlands and other local habitat types. Wetland impacts would be greatest where inundation from the impoundment would occur. Reduction of habitat value and reduced floral diversity would also be likely for a considerable distance downstream as a result of changes in the flooding characteristics of the river. The loss of wetlands within and downstream from the project area would be significant and a detailed wetland inventory is needed.

Policy established in the Section 404(b)(1) guidelines for dredge and fill permits and compliance with Executive Order 11990 on wetland protection require appropriate and practical steps be taken to minimize adverse impacts. A recommended mitigation plan addressing wetland creation and enhancement and other compensation measures for all impacted wetland areas should be submitted by the State of Utah to BLM in order to comply with the Executive Order. This plan could then be reviewed under the EIS process and a final plan submitted with the 404 permit application.

SALINITY AND SHALE LEACHATES:

67.11

Evaporation that would occur in the proposed dam has been estimated at 5,500 acre-feet/year, which is greater than one percent of the total average annual White River discharge (503,000 acre/feet/year, page 95). Losses through banks should be low, considering the geology of the project area, but should be quantified in order to verify this.

67.12

Leaching of metals and/or salts could occur through fractured material within the project area which would be aggravated by fluctuations of water levels within the reservoir. Salt crusts are clearly visible along the proposed reservoir embankment which is indicative of remaining unleached material. More information regarding the effect, if any, this may have on the reservoir and uses downstream is needed. Estimates on possible salinity increases due to the proposal should include an estimate of the amount of salt that may be leached from the reservoir embankment. In addition to quantifying salt loading and concentrating impacts created by the project, a cost estimate in terms of annual damages to downstream water users needs to be included in the EIS. Current NPS and EPA estimates are that a one mg/l increase in salinity at Imperial Dam causes approximately \$450,000 in annual economic damage.

SEEPAGE FROM ABANDONED GILSONITE WELL:

67.13

EPA concurs that it will be necessary to seal the present seepage of the abandoned gilsonite well prior to the dam closure. Specifications on this will be incorporated as conditions to any 404 permit. Therefore the applicant should define the proposed well sealing method in the permit application. Well sealing will probably require scraping of the alluvium to bedrock and reentering the hole in order to pressure grout from the bottom-up. We prefer, due to the potential of these hydrocarbons entering the hydrologic system, this be done regardless of the alternative selected. If the dam is not constructed as planned and therefore Utah would not seal the well, EPA suggests that BLM fence, and possibly provide an overhead net, in order to reduce wildlife and stock exposure.

FLOW MODIFICATION:

As the EIS indicates, modifying the flow regime of the White River raises concerns regarding its impact upon recreation, stream biota, threatened and endangered species, riparian vegetation and beach stability downstream.

67.14

If a lower flow regime is imposed upon the White River by construction of the project, significant changes in riparian vegetation are likely to occur as experience in the Grand Canyon in Arizona and the Lodore Canyon in Colorado

- 67.14 (cont.) has demonstrated. Invasion by phreatophytes, especially tamarisk, will occur in the area between the new normal high water mark and the old high water mark when flood flows are significantly reduced.

In terms of aesthetics, wildlife and recreational use and water consumption, the intrusion of tamarisk is undesirable. Camping becomes difficult where a beach is overgrown with these plants and wildlife communities are adversely affected interfering with migrating water fowl.

In addition to phreatophyte invasion, beaches downstream along the White River will be subject to structural changes if the project is built. Clear water releases (which are erosive due to increased bed load capacity) and fluctuating water levels will cause beach material to be removed and carried downstream. Deposition above the old high water mark will be largely non-existent. These changes and their impacts upon aesthetics, recreation and wildlife need to be discussed in the EIS and mitigation measures developed.

#### ALTERNATIVES

- 67.15 Considering the significant adverse environmental impacts of the proposed White River Dam Project, EPA believes the alternatives must be given careful and full consideration. Alternatives 3, 4 and 5 all involve fairly equal impacts, none being too drastic as the proposed dam. Water temperatures downstream would remain close to normal if water was directly withdrawn, although temperatures could increase slightly since the thermal buffering capacity would decrease. Amassing would not occur downstream thus preserving the habitat of the Colorado Squawfish along with other native fish habitat. We do not know of any mitigation measure that would reduce the effect of amassing. Alternatives 3, 4 and 5 (even without mitigation such as flow replacement) would exert far less pressure on the endangered species of the area. Direct withdrawal and side stream storage also avoids inundation of 165 acres of the oil shale resource, reduces salinity impacts due to reservoir leachates and reduces the potential water quality affects due to gilsonite seeps and shale leachates. Large evaporation and bank losses would be avoided if any of these alternatives were utilized.

- 67.16 The Colorado River Salinity Control Form and the State of Utah have adopted policies designed to promote the use of brackish and/or saline water as part of their commitment to maintain the numeric criteria for salinity which were adopted by the States and approved by EPA. The EIS should evaluate possible development of saline water sources for industrial uses. As an example, the saline flow (approximately 43000 ppm TDS) from Bitter Creek runs through State leases owned by TOSCO. Is it economically feasible to develop this source?

According to the EIS, groundwater use appears to be marginally attractive due to low yields of poor quality. However, information available from the USGS Area Oil Shale Office in Grand Junction indicates that during test drilling on the Ua-Ub tract, water was developed from the Douglas Creek member

- 67.16 (cont.) at high yield and with decreasing conductivity with depth. Is there a practical groundwater alternative available for some of the projected oil shale uses?

- 67.17 Future use of the White River was given inadequate consideration in alternative evaluation. The dam's future water delivery capability could be threatened by upstream withdrawals especially if Colorado desires to fully develop the White River in the absence of any interstate agreement. An agreement on the White River between Colorado and Utah could be the mechanism used to insure minimum flow from Colorado storage release, thereby reducing the risks associated with direct withdrawal.

#### WATER SUPPLY NEEDS:

The need for water from this project for development of oil shale and coal-fired power production also needs to be carefully re-evaluated. The issue is whether the proposed reservoir is necessary for energy development or is primarily speculative.

- 67.18 There is no current demonstrated need for the 67,500 acre-feet of annual demand. The White River Shale Project (WRSP) has a projected need of 13,000 to 26,000 acre-feet. Water conservation measures at the site will allow WRSP to approach the lower end of these estimates. Desert Generation and Transmission Cooperative has announced plans for a Green River withdrawal similar to Alternative 4 in order to supply 18,000 acre-feet for the proposed Moon Lake power plant. The proposed TOSCO Sand Wash Unit lacks any definite plans at this time. That proposal could include an impoundment on a side stream as an alternative water supply as well as a separate Green River diversion. Recent discussions with the Synthetic Fuel Company of Houston, which proposes a 10,000 barrel per day oil shale facility near Bonanza, indicates they prefer direct withdrawal from the White River. In fact, the company's plan to use the existing well field near Watson would be negated by inundation from the proposed reservoir.

## Response Letter 67

67.1 Alternatives 4 and 5 do provide a means for withdrawal from the White or Green Rivers as you suggested. Either of these alternatives could be used as a water source for oil shale development. Regarding development of saline sources or groundwater, see Letter Responses 25.3, 27.16, 27.17, 27.28, 27.29, 27.35, and 40.3.

67.2 The views expressed will be considered in the decision-making process. We concur with your concerns about environmental problems of the proposal. For more information about sedimentation, see Letter Responses 4.10, 5.2, 27.27, 71.3, and page 22 of the Draft EIS. See Letter Response 71.5 about eutrophication.

For discussions on salinity, see Letter Responses 6.2 and 71.4. See Letter Response 27.15 for more information about evaporation. The leachate problem is not significant; see Letter Response 64.12.

There is no evidence that toxic or other hydrocarbons from gilsonite seeps would be a problem. See Letter Response 4.5.

67.3 See Letter Responses 16.1, 37.3, 42.2, and Oral Testimony Response 6. See also the revised Chapter 1, Purpose and Need section, in this Final EIS.

67.4 The most probable origins of nutrient loading are irrigation return flows, small feedlots, and any sewage discharge which may exist. Control of these nutrient loading points would be difficult. The phosphates available in the geologic substrate could probably furnish enough phosphate to periodically cause a blue-green algal bloom. A possible hazard of a blue-green algal bloom in the proposed reservoir would be the downstream movement of the phytotoxins associated with this algae (Geer, 1981).

In any event, the reservoir is not expected to be a high quality fishery.

67.5 Although non-biological contaminants resulting from oil shale leachate are not anticipated to be a problem, the USOI, Geological Survey (1981) does not know for certain if the trace elements would cause problems or irritations. The trace elements are bonded tightly to the sediment (clay) particles and intensive studies are being conducted to find out at what point they (trace elements) are released and cause use limitations or toxic conditions. See Letter Response 64.12.

67.6 The discussion of anticipated impacts to recreation on pages 112 and 113 of the Draft EIS explains that the reservoir would probably constitute a low quality fishery. As you indicate, the character and quality of the White River recreational resources in the affected area would change from those of a river environment with important recreational values to those of a reservoir of questionable recreational quality. See the revised Recreation sections in Chapters 3 and 4 of this Final EIS.

67.7 A multiple level outlet design which would allow selection of various water temperatures is part of the proposal. The Biological Opinion determined that the White River below the dam would be managed for enhancement of native species habitat, thus avoiding violation of the Endangered Species Act. See Appendix 4 for the official FWS Biological Opinion.

67.8 This is noted on page 113 of the Draft EIS. The release of hydrogen sulfide would reduce the reservoir's recreational attraction.

67.9 We concur that changes in temperature and flow may not be the only limiting factors affecting spawning of these endangered species. See the FWS Biological Opinion, Appendix 4 of this Final EIS.

67.10 A wetlands inventory was conducted on the White River in Utah during 1980. Important acreages were identified near the confluence of the White and Green Rivers. See Letter Response 65.10.

67.11 See Letter Response 27.15 for additional information. As you point out, water losses through bank storage are considered to be insignificant. Losses from bank storage and/or into aquifers would be approximately 0.09 cfs when the reservoir was full. See Letter Responses 27.35 and 27.36.

67.12 For information about leaching of metals and/or salts, see Letter Responses 6.2 and 64.12. It appears likely, based on Phillip's report (1980), that increased salt concentrations resulting from water contact with geologic units (Uinta Formation) in the reservoir sides would be only a small fraction of salt increases resulting from reservoir evaporation.

Cost estimates in terms of annual damages to downstream water users have been revised in this Final EIS. See Letter Responses 64.6, 70.5, and 71.4.

67.13 See Letter Response 4.5. Please note that the hydrocarbon seep is an old exploratory drill hole located on private property and is, therefore, not under the management jurisdiction of the Bureau of Land Management.

67.14 The information provided has been considered in the impact assessment sections of this Final EIS. The potential for increased invasion of phreatophytes and development of new characteristics of the stream below the proposed dam are recognized along with other potential changes in the river system.

67.15 The views expressed will be considered in the decision-making process.

67.16 The use of brackish water was not made part of this EIS and the use of groundwater was dismissed early in the study process because of the cost of desalting for industrial purposes. See Letter Responses 25.3, 27.16, 27.17, 27.28, 27.29, 27.35, and 40.3.

67.17 We concur. See Letter Responses 37.3, 42.2, and Oral Testimony Response 6 for other information.

67.18 For information about oil shale development water needs, see the revised Chapter 1, Purpose and Need section, in this Final EIS.



United States Department of the Interior

FISH AND WILDLIFE SERVICE  
AREA OFFICE, CARLSBAD, UTAH  
1001 FEDERAL BUILDING  
1200 NORTH STATE STREET  
SALT LAKE CITY, UTAH 84103

IN REPLY REFER TO: (ES)

February 19, 1981

MEMORANDUM

TO: Lloyd Ferguson, District Manager  
Vernal District, Bureau of Land Management  
Vernal, Utah

FROM: Acting Area Manager  
Fish and Wildlife Service  
Salt Lake City, Utah

SUBJECT: White River Dam Project, Utah - Review of Draft Environmental  
Impact Statement, No. 1792

We have reviewed the draft environmental statement for the White River  
Dam project within the scope of our expertise and responsibility, and  
offer the comments listed below.

General Comments

In general, the document is well prepared and objectively addresses  
most environmental impacts of the proposed project. Of the many environmental  
statements reviewed by this office this document ranks among the better  
ones. BLM and their contractors are to be commended for the job they  
have done.

- 68.1 Adverse impacts to some non-endangered wildlife species and potential  
mitigation measures to reduce losses have not been fully addressed in  
the draft EIS. We recognize that you were relying on our Fish and  
Wildlife Coordination Act Report to provide at least a portion of this  
type information. The Coordination Act Report has subsequently been  
completed and submitted to BLM. It is our understanding that the report  
will be inserted in the final EIS. The Coordination Act Report should  
be considered as a portion of our comments on the draft EIS. We will  
not comment extensively on matters covered in the Coordination Act  
Report.
- 68.2 The EIS contains a number of tentative conclusions on project impacts,  
or lack thereof, on endangered fishes. We recognize that in preparation  
of an EIS it is often necessary to make the best assessment possible at  
the time based on available data. We do emphasize however, the importance  
of recognizing that some of these conclusions may or may not be valid in  
light of information gained from further studies. We also emphasize  
that an official biological opinion has not been issued by the Fish and  
Wildlife Service.

-2-

- 68.3 Alternatives and mitigation proposals involving release of supplemental  
flows from Flaming Gorge Reservoir should include discussion of potential  
impacts on the reservoir fishery of Flaming Gorge and on managed waterfowl  
areas downstream along the Green. Also, water from Flaming Gorge,  
though now warmed several degrees by recent penstock modifications, is  
still considerably colder in the summer than water in either the White  
or Yampa Rivers. An increased release of comparatively cold Flaming  
Gorge water at times when Yampa and/or White River flows are low would  
have the potential for adverse downstream impacts. This possibility  
should be addressed.
- 68.4
- 68.5 An alternative not addressed but meriting mention, even though detailed  
analysis is probably beyond the scope of this EIS, is comprehensive  
planning for efficient and environmentally sound development and use of  
water resources. The present proposal and previous water projects  
mainly represent a piecemeal, project by project approach. For example,  
the Ronneville Unit of the Central Utah Project would divert to the  
Wasatch front approximately 126,600 acre feet of Green River water which  
would otherwise be available for energy development within the Uintah  
Basin.

Detailed Comments

- 68.6 Page 40, Table 2-1 - Birds - Alternative 1: Further reductions would  
occur for some species from loss of nesting or winter roosting habitat.
- 68.7 Page 41, Birds - Alternative 1: Canada goose losses below the dam have  
been quantified by Utah DWR as being nesting habitat for about 14 geese  
and annual production of about 42 geese.
- 68.8 Page 41, Terrestrial Wildlife - Threatened and endangered Species: There  
would be a loss of riparian roosting, perching and feeding habitat for  
bald eagles. This loss may or may not be compensated for by ice free  
feeding areas in the tailwater.
- 68.9 Page 64, Birds - Paragraph 5: Although bald eagles probably do not  
winter in the general area of the project in particularly large numbers,  
the bald eagles that do winter in the area make consistent use of riparian  
habitat. Therefore, they probably should be considered common within  
the immediate project area.
- 68.10 Page 72, Paragraph 3: The Utah DWR estimates at least 2400 days of deer  
hunting by boat annually in this portion of the White River.
- 68.11 Page 101, Mitigation: The term "none" is not appropriate without further  
explanation. The flood plain and riverine habitats are highly productive  
for a great diversity of wildlife, and we agree completely that there is  
no true replacement for loss of this unique and scarce resource. However,  
some mitigation is possible for certain types of wildlife. These are  
discussed in the Fish and Wildlife Coordination Act Report.

## Response Letter 68

-3-

- 68.12 Page 107, Threatened, Endangered, and Sensitive Bird Species: It is not certain that there would be a net enhancement for bald eagles. Loss of riparian roosting and hunting habitat could offset the potential benefits of the reservoir and several miles of ice free tailwater.
- 68.13 Page 108, Paragraph 5: The possibility for some kind of trout fishery should not be ruled out even though reservoir conditions would not be optimal.
- 68.14 Page 110, Anticipated Impacts - Paragraph 4: Although it is possible that only a few bonytail chubs within the White River itself would be directly affected, potential impacts downstream in the Green River should not be ignored.
- 68.15 Page 113 - Paragraph 1: It should be noted that inundation of a 13.5 mile river segment in the middle of a much longer reach that is desirable for canoeing greatly lowers the value of the entire reach for those preferring longer, overnight canoe or raft trips.
- 68.16 Page 142, Cumulative Impacts - Paragraph 7: Riparian habitat together with the high diversity of wildlife dependent upon it is a unique resource that is in scarce supply and is being reduced rapidly. Cumulative losses to this resource are serious and should be mentioned.
- 68.17 Page 143, Table 4-14: The proposed Juniper-Cross Mountain project on the Yampa River would store 1,082,000 acre-feet of water. It would deplete a minimum of 60,000 acre feet annually by reservoir evaporation and could indirectly cause the ultimate depletion of nearly 500,000 acre-feet. This project should be included under potential depletions.

The opportunity to comment is appreciated.

cc: RD, FWS, Denver, CO  
Dir, UGAR, SLG  
Dir, FWS, Washington, D.C.

*Ronald E. Lindberg*

- 68.1 Adverse impacts to non-endangered wildlife species and viable mitigating measures are identified in this Final EIS. The report prepared by FWS with coordination from the Utah Division of Wildlife Resources under provisions of the Wildlife Coordination Act has been most helpful and is included as Appendix 10 in this Final EIS.
- 68.2 The FWS Biological Opinion is included in this Final EIS as Appendix 4.
- 68.3 The potential releases would not cause any significant effects on the Flaming Gorge Reservoir fishery.  
The 1- to 3-percent increase in flow from the dam to the point of pumping (discussed in the Draft EIS on page 95 and Table 4-3), relative to present water release fluctuations from the dam, would not significantly affect any waterfowl management areas.
- 68.4 If cold Flaming Gorge water entered the Green River at times when the White and Yampa flows were low, endangered fish could be affected. Temperature selection outlet works have been installed at the Flaming Gorge Reservoir to help prevent this problem.
- 68.5 It is not the Bureau of Land Management's responsibility for river basin planning. In Utah, the public waters are managed and appropriated to users by a public agency (Utah Division of Water Rights). Further, the Utah Division of Water Resources (proponents of this project) has the responsibility to plan for wise and beneficial uses of water in the State of Utah.
- 68.6 Nests and roosts are an integral part of the term "habitat". Losses of birds indicated in Table 2-1 include losses from nests and roosts.
- 68.7 Table 2-1 is revised in this Final EIS.
- 68.8 It is the opinion of most biologists involved with this EIS and others who were consulted that there would not be an actual loss to bald eagles. Impacts may actually be neutral or beneficial.
- 68.9 The abundance categories used in this EIS in order of occurrence are:
- |            |
|------------|
| Common     |
| Uncommon   |
| Rare       |
| Occasional |
| Unknown    |

Because there are three other categories of less abundance than "uncommon", we believe this category reflects the actual situation better than "common", which would indicate the highest category of abundance. For more information, see Appendix 7 in this EIS.

- 68.10 Your estimate is included in this Final EIS. See the revised Hunting section under Recreation, Chapter 3.

## Comment Letter 69

68.11 The text has been revised. See Chapters 2 and 4 for mitigation.

68.12 The statement does not say "for certain" and is in accord with your agency's technical assistance report (included in this document) which states "impacts on the bald eagles... may be about neutral."

68.13 The dam is currently being designed to release water at warm temperatures. Consequently, a marginal trout fishery would not be possible.

68.14 Impacts of the White River Dam on the Green River affecting the bonytail chub were addressed on page 111 of the Draft EIS and are also discussed in Chapter 4 in this Final EIS. Also, see Appendix 4.

68.15 The reservoir created by the proposed dam would reduce the quality of canoe trips for those preferring a stream-canoeing experience. At the same time, it could provide a positive experience for those who enjoy flat-water canoeing.

As you indicate, the reservoir would lower the quality of experience for those seeking an extended stream-canoeing experience.

68.16 The correction has been noted and a text change made with the following addition. "The loss of 995 acres of riparian habitat, when combined with losses to other riparian-destroying projects within a 200-mile radius, would have a substantial cumulative impact on a wide variety of wildlife species."

68.17 As you indicate, there is potential for depletion of about 900,000 acre-feet annually from the flow of the Yampa River. The Upper Colorado River Compact, Article XIII, specifies that, "Colorado will not cause the flow of the Yampa River at the Maybell gaging station to be depleted below an aggregate of 5,000,000 acre-feet for any period of ten consecutive years...." The average annual flow at the Maybell station during the period 1971 to 1976 was 1,176,497 acre-feet. Thus over 500,000 acre-feet would be available for consumptive use in Colorado under terms of the compact.

While the Juniper-Cross Mountain project is proposed for hydroelectric generation, it would also have potential to provide water for consumptive uses. The Colorado River Water Conservation District, proponents of the project, estimate the two proposed reservoirs would have evaporative losses of 63,500 acre-feet per year.

The Colorado Department of Natural Resources estimates average annual consumption from the Yampa River under year 2000 conditions to range from 166,000 to 198,500 acre-feet. When combined with the above evaporative losses, depletions from the Yampa River may range from 229,500 to 262,000 acre-feet in the year 2000. These figures exclude increased depletions from the Little Snake River which could result from water resource developments on that tributary of the Yampa.



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February 13, 1981

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Mr. Lynn Leishman, Team Leader  
Bureau of Land Management  
155 East 900 North  
Richfield, Utah 84701

Dear Mr. Leishman:

This is to offer our brief comments on the draft EIS for the White River Dam Project.

While much good work has gone into the preparation of the draft EIS on this subject, we wish to emphasize that it is inadequate without the completed, critically needed report from the U. S. Fish and Wildlife Service. Where an endangered species is involved, the public should be entitled to the facts from the authorized agency administering the Endangered Species Law.

Making a preliminary decision without this report involves acting without important facts, as well as perhaps influencing the Fish and Wildlife Service recommendations themselves. Unfortunately, this type of action too often threatens a final decision in the best long-range interest of the public's resources. In addition, it promotes confrontation, appeals and litigation.

We respectfully ask that these remarks be included in the official record on this subject.

Sincerely,

*Clifton R. Morrill*

Clifton R. Morrill  
Executive Director

CRN:tj

cc-Kim Crambo  
Dick Carter, UWA

69.1

69.2

## Response Letter 69

69.1 The FWS Biological Opinion is included as Appendix 4 in this Final EIS.

69.2 There has been no attempt to influence any decision. The determination to delay the Final EIS and the project was made in the interest of gathering more data so that a well-informed decision could be made. Please note on page 43 of the Draft EIS, "The new FWS information and the public comments on this Draft EIS may or may not lead to the selection of a different agency-preferred alternative than now identified by BLM."

## Comment Letter 70



STATE OF UTAH  
OFFICE OF THE GOVERNOR  
SALT LAKE CITY  
84114

SCOTT M. MATTHEWS  
GOVERNOR

February 24, 1981

Mr. Lloyd H. Ferguson  
District Manager, Vernal District  
Bureau of Land Management  
170 South 500 East  
Vernal, UT 84078

Dear Mr. Ferguson:

We have carefully reviewed the Draft Environmental Impact Statement for the proposed White River Dam. It appears that the Draft Environmental Impact Statement has been prepared in a careful and thoughtful manner covering all of the main areas of concern. However, we want to emphasize two points that have been the center of much discussion:

70.1

1. The possible loss of water into mines from the reservoir either through joints, aquifers, or bedding plains; and,
2. The integrity of anchoring the dam into the Uinta formation.

It is agreed that the possible loss of water from the reservoir into proposed mines is a definite possibility. However, the geologic structure of the area (prevailing dip to west and northwest) will tend to minimize this problem in Tracts Ua and Ub, but could make it a matter of concern north and northwest of the reservoir.

The existence of a reservoir in this area will also exclude the possibility of mining oil shale beneath the reservoir proper. White River Shale has already investigated the jointing situation to some extent and has drilled two slanted core holes to intersect possible jointing systems. From these it has concluded that the extensive joint system seen in the Uinta formation does not extend downward into the Green River formation. The cores indicate that the Green River formation is relatively free of fractures and joints. There is agreement, however, that there exists the possibility of leakage from the reservoir through various conduits into some mining areas. The operators of these Tracts, however, seem confident that the problem can be handled.

Mr. Lloyd Ferguson  
Page Two

February 24, 1961

70.2

The reports written by the Utah Geological and Mineral Survey, which points out the possibility of geologic problems with the proposed dam site, are enclosed for your review. The problems identified in these reports are being addressed in the plan for mining of the two prototype oil shale tracts situated immediately south of the proposed reservoir. They are also being thoroughly explored by Bingham Engineering, who has been retained to investigate the dam site and make a final design. The geological report for the dam presently being prepared by Bingham Engineering will contain the necessary data to determine the feasibility of the proposed dam site and to properly design the proposed dam. When this report is finalized, we will see that the Bureau receives a copy.

Our technical comments on the Draft Environmental Impact Statement are enclosed for your consideration. We appreciate the opportunity to review and comment on this Document.

Sincerely,

  
Governor

SMW:geh

Enclosures

STATE OF UTAH TECHNICAL COMMENTS

DRAFT WHITE RIVER DAM PROJECT

ENVIRONMENTAL IMPACT STATEMENT

GENERAL COMMENTS

70.3

The Draft Environmental Impact Statement does not detail any pollution control facilities for meeting appropriate effluent limitations or water quality criteria to control sediment or other contaminants during construction of the White River Dam. However, plans and design criteria for these controls will no doubt follow at a more advanced stage of the planning.

70.4

Appendix 1 lists Federal and State authorizing actions needed for the various alternatives. Several divisions in State government are listed, but there is no mention of the Division of Environmental Health or the Bureau of Water Pollution Control. These agencies should be added to Appendix 1 in order to help assure that appropriate approvals are obtained for water pollution control facilities during the construction and operation of the project.

70.5

All development alternatives discussed in the Environmental Impact Statement anticipate a salinity increase of 3.4 mg/l at Imperial Dam because each alternative would result in the depletion of approximately 70,000 acre-feet per year of water from the river system. This estimate is probably valid, but the actual salinity increase and amount of water depletion would depend on the details of future use as to the type, extent, amount, and kind of return flow if any.

70.6

It also appears that the depth of this reservoir may be sufficient to cause some degree of stratification in the future with an accumulation of denser water at lower elevations. Consequently, it might be worthwhile to consider the practicality and benefits of providing for multiple level outlet options in the final designs of the dam outlet works.

SPECIFIC COMMENTS

Summary

70.7

Page 1, Introduction - The request for water by the energy development companies has changed since information was given to the Bureau of Land Management for the Statement. The White River Shale Company's request has increased slightly. The request by TOSCO has been cut in half and several new companies have made requests to the Division of Water Resources for water. The State would be happy to go over these changes and new requests with Bureau of Land Management.

- 70.8 | Page 1, Paragraph 1, Line 4 - The Draft Environmental Impact Statement shows 3,560 acres of land being utilized by the project. The Division of Water Resources shows 2,377 acres of public land being proposed for the reservoir and huffer areas. The rest must be roads, power lines, and borrow areas. This should be pointed out in the Impact Statement.
- 70.9 | Page 1, Paragraph 1, Line 9 - The numbers for the total and active storage in the Draft are not consistent. Please use 67,000 acre-feet as the active storage and 38,000 acre-feet as the dead storage.
- 70.10 | Page 1, Paragraph 8; Page 7, Paragraph 7 - This should also mention the razorback sucker as a sensitive species in declining status. This species should be mentioned in like discussions throughout the assessments as it is present in the Green River system.
- 70.11 | Page 2, Paragraph 2 - Hunting and fishing are important recreational uses and should be mentioned.
- 70.12 | Page 3, Paragraph 3 - An additional 122 acres for the dam and spillway should be added to the stated 1,860 acres.
- 70.13 | Page 3, Paragraph 4 - Loss of nesting habitat for 144 Canada geese, 12 raptor species, numerous passerine birds and several small mammal species should be added.
- 70.14 | Page 3, Paragraph 6 - The bonytail chub, humpback chub, razorback sucker, and other fishes should be added. This also applies to Page 4, Paragraph 1, 3, and 8.
- Chapter 1
- 70.15 | Page 5, Purpose and Need of Proposed Project - As was referred to in comments on the summary, the requests for water from the project since the Impact Statement was prepared have changed. The Division of Water Resources would be happy to review the present status of request by those companies listed in the Draft Environmental Impact Statement and new companies now requesting water from the project.
- 70.16 | Page 8, Paragraph 3 - Bingham Engineering is preparing a geology report that will include information on the movement of water from the reservoir into surrounding formations. This report will be provided to BLM as soon as it is available.
- Chapter II
- Page 9, Paragraph 3 - This paragraph on need for storage by western rivers is a good statement.
- 70.17 | Page 9, Paragraph 7, Line 6 - The active capacity of the proposed project is 67,000 acre-feet.
- 70.18 | Page 11, Paragraph 3 - Storage values are 67,000 acre-feet and 38,000 acre-feet. The 1,990-acre figure is not consistent with the 1,860 figure on Page 3. An additional 122 acres for dam and spillway should be included.

- 70.19 | Page 15, Figure 2-4 - The dam shown goes to the top of the right abutment. This would be a dam in excess of 250 feet. The proposed dam is 124 feet above the stream bed.
- 70.20 | Page 18, Figure 2-7 - The range given for the penstock should be 6 to 10 feet. Also, the design of the intake tower may change depending on final water temperature required below the dam.
- 70.21 | Page 19, Paragraph 10, Line 2 - When a discharge is quoted, the location of the measurement, the source, and the period of record should also be given.
- 70.22 | Page 19, Paragraph 10, Line 9 - The range of releases from the reservoirs, bypass pipe, and power penstock are still subject to some minor changes in the final design.
- 70.23 | Page 19, Paragraph 10, Line 19 - Again, the request from TOSCO has changed. It might be better to refer to this as "... Downstream requirements for energy development ...".
- 70.24 | Page 22, Paragraph 3, Line 2 - Note that the sum of the 7,000 and 31,000 acre-feet is the 38,000 acre-feet.
- 70.25 | Page 22, Paragraph 4 - The Division of Water Resources has reviewed the report referenced Grenney and Kraszewski (1980). This study analyzes the sediment at Ouray and then attempts to estimate how much of that sediment would occur upstream at the damsite. It is the opinion of the Division of Water Resources that the sediment at the damsite was over-estimated and that the life of the proposed project is considerably longer than the projections of the Grenney-Kraszewski study.
- 70.26 | Page 24, Last Paragraph - State Law (Section 23-15-4) requires fish screens in the waterworks systems of the project.
- 70.27 | Page 32, Paragraph 3 - The statements indicating that storage would have only been needed one year out of 50 does not appear reasonable unless the analysis was made using monthly flows rather than daily flow. A review of the daily flow shows many dates when the historical daily flows dropped below the 347 cfs (240 plus 97) that would be needed to meet conditions as discussed in the Environmental Impact Statement. When depletion upstream is also considered, there is no question that storage is necessary to support the levels of energy development being planned near the White River.
- 70.28 | Page 34, Comparative Cost - The cost of this alternative (Alternative No. 3) would be much higher if the large dam, which is comparable to the other alternative, was used.
- 70.29 | Page 40, Table 2-1, Alternative 1, Vegetation, General - It states here that 995 acres of riparian and 557 acres of upland vegetation (total 1,552 acres) would be inundated by reservoir under Alternative 1. Correct figures would be 995 acres riparian vegetation and 997 acres of upland type from the reservoir, dam, and spillway (p. 93).

70.30 Page 40, Vegetation--Threatened, Endangered and Sensitive Species under Alternative 1 - The term "population" tells nothing about the acreage and/or number of individuals of the potentially new Penstemon.

70.31 Page 40, Terrestrial Wildlife--Birds, Alternative 1 - Reduction of raptor populations due to loss of nesting habitat should be added.

70.32 Page 41, Terrestrial Wildlife--Birds, Alternative 1 - The following statement should be added: "Nesting habitat for about 12 Canada geese with annual production of as many as 36 goslings would be lost from the reservoir basin and nesting habitat for about 14 geese and production of as many as 42 goslings along 45 miles of river below the dam would be reduced and could be eliminated, thus adversely affecting a minimum of 26 nesting geese annually."

70.33 Page 41, Terrestrial Wildlife--Threatened and Endangered Species, Alternative 1 - Could the "loss of habitat" be quantified. The following statement should be added: "The loss of riparian roosting, perching, and feeding habitat would be an adverse impact on the bald eagle. This loss may be offset by ice-free feeding habitat in the reservoir and a portion of the river downstream." The peregrine falcon should also be listed since it is discussed on Page 64.

70.34 Page 41, Aquatic Wildlife--Threatened and Endangered Species, Alternative 1 - The honeytail chub, the humpback chub, and the razorhack sucker should be added.

70.35 Page 42, Recreation, Alternative 1 - There is no goose hunting in the area. Geese leave and go elsewhere in the fall.

#### Chapter III

70.36 Page 51, Paragraph 4, Line 4 - Information about the American Gilsonite's water supply should indicate it comes from wells along the river.

70.37 Page 51, Paragraph 6 - This data gives general information about the hydrology, but does not give enough facts. Inasmuch as low flows are of particular concern, the probabilities of the data given might be added.

70.38 Page 60, Table 3-5, Alternative 1 - The acreage figure for upland (547) is listed 557 on Page 40 and should be increased by approximately 430 acres to conform with the dam plus reservoir acreage of 1,982 acres.

70.39 Page 61, Table 3-7 - The bald eagle does not nest in the area. The peregrine falcon is a cliff and not a riparian nester.

70.40 Page 64, Paragraph 6 - The bald eagle is considered to be a common winter resident.

70.41 Page 64, Paragraph 8, Line 4 - Delete "only" and insert "primarv."

70.42 Page 65, Paragraph 5 - The number of White River miles impacted (separated by inundated and noninundated reaches) should be stated.

70.43 Page 65, Paragraph 8 - Paragraph should provide tables of "eight species of mayflies" found to be most abundant and sample densities or biomass. Also, paragraph needs additional discussion concerning reasons for low macroinvertebrate abundance. Excessive flow fluctuations, excessive turbidity and sedimentation are three additional factors limiting populations. Lack of riffles indicates substrate deficiencies and may be a good clue to additional limiting factors.

70.44 Page 66, Threatened and Endangered Species - Locations of endangered fish collections should be mapped and presented as a figure in this section.

70.45 Page 66, Paragraph 12 - Should state number of river miles impacted.

70.46 Page 66, Paragraph 13 - Should state mileages of each type of habitat (or relative percentage of total river miles).

70.47 Page 69, Paragraph 9 - Canoeing White River requires certain minimum flows. Should discuss these aspects.

70.48 Page 72, Paragraph 3 - Sentence should be changed. More than 240 hunter-days are spent in deer hunting by boat in the project area annually.

70.49 Page 72, Paragraph 4 - Sentence should be changed. The Bonanza Antelope Unit provides an average of 70 antelope hunter-days annually.

#### Chapter IV

70.50 Page 91, Minerals, Paragraph 1 - The reservoir will not prohibit the development of the three pre-1920 unpatented mining claims. The normal high surface level of the reservoir is at elevation 5015 feet. At this elevation, the reservoir would only back water into Section 5, T10S, R25E. The three mining claims are in Section 33, 19S, R25E, which is well above the 5015-foot elevation of the high surface elevation of the reservoir.

70.51 Page 95, Paragraph 7 - This paragraph states that morphological changes will occur in White River below the dam, but does not carry this observation to its logical conclusion--that the new channel will likely be narrower, deeper, possibly with higher mean current velocity, and more heavily armored. This affects final minimum flow requirements and nature and type of tailwater fishery. Paragraph should expand discussion into projected channel changes.

70.52 Page 98, Paragraph 5 - The State would consider changes in the design to allow releases from the reservoir at higher levels if such were determined to be necessary.

70.53 Page 101, Mitigation - The term "more" should be deleted. Acquisition and development of replacement habitat and maintenance and development of remaining islands would provide appropriate mitigation.

70.54 Page 101, Paragraph 10 - The acres given should be those inundated at the highest water elevation, which would be 995 acres riparian and 987 acres upland vegetation including the dam and spillway areas.

- 70.55 Page 103, Paragraph 2 - The sentence should be changed. The loss of occupied vegetation would be mitigated to the extent possible according to plans developed by the U. S. Fish and Wildlife Service under authority of the Fish and Wildlife Coordination Act.
- 70.56 Page 103, Paragraph 3 - The figure 557 should be changed to 987. Also, Table 4-1 shows a total of 1,982 acres to be occupied by the dam and reservoir.
- 70.57 Page 104, Table 4-4 - The figure of 189 cottontails is too low.
- 70.58 Page 105, Paragraph 8 - The riparian area is the limiting factor on herd productivity as it provides the only good fawning habitat.
- 70.59 Page 107, Paragraph 2 - At least eight raptor species nest in the riparian habitat. Therefore, the sentence should be changed to include this use. Alternative 1 would adversely affect raptors by eliminating nesting habitat and prey base for eight species that nest and 14 species that hunt in the riparian habitat, as shown in Table 3-7, Page 61.
- 70.60 Page 107, Paragraph 6, Sentence 1 - Sentence should be changed to say that reservoir basin provides habitat for more than 48 Canada geese annually consisting of six nesting pairs with production of as many as 36 goslings annually and, in addition, use by some nonnesting adults.
- 70.61 Page 107, Paragraph 6, Sentence 2 - The sentence should be changed to say that the river below the dam provides habitat for more than 56 Canada geese annually, consisting of seven nesting pairs with production of as many as 42 goslings annually and, in addition, use by some nonnesting adults.
- 70.62 Page 107, Paragraph 8, Sentence 1 - Sentence should be changed. Loss of nongame birds and raptors that use riparian habitat could only be partially mitigated.
- 70.63 Page 107, Paragraph 8, Sentence 4 - Sentence should be changed to say that mitigation for geese could be accomplished by maintaining islands for goose nesting downstream from the proposed dam and providing artificial nest platforms on all islands above and below the reservoir. Such efforts will, at best, preserve current production. It will not compensate for losses within the reservoir site.
- 70.64 Page 107, Paragraph 10, Sentence 2 - Loss of raptors from loss of nesting habitat should be added.
- 70.65 Page 107, Paragraph 11, Sentence 2 - The ice-free waters could offset the loss of riparian roosting habitat, but not enhance the bald eagle wintering habitat; therefore, a statement should be added regarding the loss of winter roosting habitat.
- 70.66 Page 107, Mitigation - The word "none" should be deleted. The loss of riparian winter roosting habitat could have an adverse impact on bald eagles.
- 70.67 Page 108, Paragraph 5 - This paragraph should also state the possibility of a trout fishery (however marginal) in the reservoir.

- 70.68 Page 111, Paragraph 1 - Water temperature increases in Flaming Gorge Reservoir tailwater were not increased to levels necessary for squawfish, so were never expected to improve squawfish habitat. They only raise the temperature to 56°F in summer.
- 70.69 Page 113, Paragraph 10, Sentence 1 - The sentence should be changed to include the following: The loss of Canada goose production and use in the reservoir and river downstream, involving as many as of 104 geese annually, will result in a loss of 450 goose hunter-days annually, primarily outside the immediate project area.
- 70.70 Page 122, Paragraph 5 - As the reservoir would fluctuate greatly each year, there would be no nesting benefits to waterfowl.
- 70.71 Page 128, Paragraph 4 - Releases from Flaming Gorge Reservoir will accentuate drawdown in the reservoir. The impact of greater drawdown in Flaming Gorge Reservoir needs to be addressed.
- 70.72 Page 129, Paragraph 2, Mitigation - Delete "none" and add "to be determined."
- 70.73 Page 133, Results, Paragraph 4 - It indicates that  $9.9 \times 10^{10}$  BTU would be generated each year by the power plant. On Page 134, Table 4-12, Alternative 1, it shows  $9.9 \times 10^9$ . Should these numbers be the same?
- 70.74 Page 136, Table 4-13, Column 1, Paragraph 3 - Losses would also occur to raptors utilizing the riparian habitat for nesting.
- 70.75 Page 136, Table 4-13, Column 1, Paragraph 4 - The potential for loss in goose production below the reservoir is not small (42 goslings/year).
- 70.76 Page 142, Paragraph 6 - The humpback chub and razorback sucker should be added to the discussion.
- 70.77 Page 142, Paragraph 7 - Discussion of cumulative losses of endangered species, waterfowl (geese), and raptors should be added.
- 70.78 Page 175, Appendix 5, Table A - The uncommon designation "U" should be deleted from mule deer and pronghorn antelope since they are both common in the project area.
- 70.79 Page 177, Appendix 5, Table B - The uncommon designation "U" should be deleted from the Cooper's hawk since it is a common permanent resident.
- 70.80 Page 177, Appendix 5, Table B - The uncommon designation "U" should be deleted from the bald eagle since it is a common winter migrant.

## Response Letter 70

- 70.1** The Bingham Engineering Site Investigation Report (1981b) confirms that waters from the reservoir would prevent mining portions of White River Oil Shale Tracts Ua and Ub beneath the reservoir proper. The reservoir would inundate some of the thickest oil shale deposits in the tracts. These deposits are 90 to 130 feet thick with an average yield of 25 gallons of shale oil per ton.
- Where oil shale mining occurs below the water table near the reservoir level, open fractures as a result of subsidence and propagation of stress releases could necessitate additional mine dewatering. See also Letter Responses 25.13, 27.37, and 64.14.
- For a discussion of the integrity of anchoring the dam into the Uinta formation, see Appendix 12 in this Final EIS.
- 70.2** The Site Investigation Report, White River Dam Project (Bingham Engineering, 1981b) presents the results of an investigation of the site foundation, reservoir basin conditions, reservoir impacts, and the location of construction materials. The principal results, conclusions, and recommendations are found in Appendix 12.
- 70.3** The proponents of the White River Dam and Reservoir must adhere to State of Utah laws and be regulated by the State Health Department regarding pollution control, effluent discharge, water quality degradation, and other contaminants during the construction phase. Plans, designs, etc., will be part of the overall project as you observed. Also, see Letter Responses 15.2 and 25.13 for more information.
- 70.4** The information has been added. See the revised Appendix 1 in this Final EIS.
- 70.5** Your observation is correct. The planned water use is for oil shale development; there would be no return flows. The Bureau of Reclamation has stated that 3.4 mg/l is a low estimate, and that 4.1 mg/l is more accurate and should be used to estimate the worst-case analysis of 70,000 acre-foot depletions.
- 70.6** Multiple level outlets have been incorporated into the final design of the dam. See the revised Figure 2-8 in this Final EIS.
- 70.7** The Utah Division of Water Resources has revised the list of water users. See the Summary and Purpose and Need section of Chapter 1 in this Final EIS.
- 70.8** Table 4-1 provides a breakdown of project components for number of acres disturbed and occupied for each alternative by land ownership.
- 70.9** Your comment is noted. The Introduction to Chapter 1 has been revised to indicate the latest total and active storage levels.
- 70.10** Chapter 3, Green River section, has been revised to reflect the comment.
- 70.11** As indicated in the revised Recreation section of Chapter 3, there is limited fishing and hunting in the project area. Because of the low quality of the fishery and the area's relative inaccessibility for hunters, few sportsmen use this segment of the White River.

- 70.12** The Utah Division of Water Resources' project proposal (August 1979) provided BLM with the 1,980 calculated surface acres. The 122 acres you refer to for the dam and spillway are not, in fact, surface acres inundated by the reservoir and thus should not be added to the 1,980-acre figure projected by the applicant. However, the surface acres given in the Draft EIS should have been 1,980, not 1,860. The Introduction to Chapter 1 has been corrected in this Final EIS.
- 70.13** The Summary of the EIS is meant to provide a brief overview of the entire document and not go into great detail. The level of detail mentioned in the comment can be found in Chapter 4, Environmental Consequences section, and in Table 2-1, Summary of Significant Unavoidable Adverse Impacts.
- 70.14** Chapter 3 has been changed as suggested.
- 70.15** See the revised Summary and Chapter 1 in this Final EIS.
- 70.16** The Bingham Report was provided to BLM in July 1981. The conclusions and recommendations of the report are included in this Final EIS as Appendix 12.
- 70.17** Your comment has been noted. The Introduction to Chapter 1 in this Final EIS has been revised to reflect the correct active capacity of the reservoir.
- 70.18** The numbers have been corrected in the Introduction to Chapter 1 in this Final EIS. See Letter Response 70.12.
- 70.19** The comment is noted. However, this visual simulation has been included to give the reader a rough idea of before and after the proposed project. It is not intended to be an exact engineering portrayal of the dam.
- 70.20** The figure has been revised to show a penstock diameter of 10 feet in Chapter 2 of this Final EIS.
- 70.21** The text has been revised as suggested in Chapter 2.
- 70.22** Please refer to Appendix 3, as stated in the sentence referred to. This appendix goes into greater detail on the subject.
- 70.23** See the revised Chapter 1, Purpose and Need section, in this Final EIS.
- 70.24** The 38,000 acre-foot figure is noted and the text has been corrected in this Final EIS.
- 70.25** Thank you for your opinion. The Utah Division of Water Resources was involved in a coordination meeting on July 15, 1980 with specialists who had questions about the sedimentation problems. The estimates made previously by Clyde (1980), Lazenby (1974), Hook (1976), and Bingham Engineering (1976) all differed significantly. After a lengthy review of the projections, methodology, and assumptions used by previous investigators, the procedures were developed by the group to provide the best

- 70.25 (cont.)** estimate with the available data and then given to Grenney and Kraszewski to develop the sedimentation potential.
- 70.26** While Section 23-15-4 Wildlife Resource Code of Utah does require that screens be furnished and maintained, the Utah Division of Wildlife Resources (UDWR) stated in a letter to BLM (September 3, 1981) that placement is at the discretion of the Wildlife Board where circumstances require screening to protect the resource. If UDWR does not request such a screen in writing, a violation has not occurred. In the past, UDWR has not required screens on large dams constructed by the Bureau of Reclamation or on smaller dams built through financial assistance through the Utah Division of Water Resources. At the present time, UDWR has no plans for requiring screening devices for the proposed White River Dam Project.
- 70.27** The analysis was made using monthly flows. Also, depletions upstream were outside the scope of this Draft EIS.
- 70.28** This comment is noted.
- 70.29** Please refer to Table 3-5 on page 60 of the Draft EIS which states that riparian acreages do not include the river channel (footnote c). Total acreage for the dam, spillway, and reservoir is 2,102 acres. There are 995 acres of riparian and 547 acres of upland vegetation, which means that 470 acres of the total is river channel. Note that the figure of 557 for upland vegetation (page 103 of the Draft EIS) has been changed to 547; also, that the figure of 1,860 acres for the reservoir (Table 4-1 of the Draft EIS) has been changed to 1,980 in the Final EIS. Your assumption does not take into account the 470 acres of unvegetated river channel portions of the proposed 1,980 surface acre reservoir.
- 70.30** Neither the acreage nor number of individuals of the potentially new species of *Penstemon albidus* were stated in the Draft EIS because very little was known at that time about this plant's distribution or occurrence. This Final EIS indicates that the population that would be inundated is comprised of about 200 individual plants in 1 to 2 acres.
- 70.31** Table 2-1 and the text in Chapter 4 have been revised in this Final EIS to reflect this information.
- 70.32** Table 2-1 and the text in Chapter 4 in this Final EIS have been revised to reflect this information.
- 70.33** Table 2-1 is meant to quickly summarize the significant unavoidable adverse impacts, not to go into great detail. The level of detail mentioned in the comment can be found in the discussion of Anticipated Impacts to Threatened and Endangered Species in Chapter 4, the FWS Technical Assistance Report (Appendix 10), and the FWS Biological Opinion (Appendix 4), in this Final EIS.
- 70.34** Table 2-1 has been revised to include this information.
- 70.35** Available information indicates a small amount of goose and duck hunting occurs in the project area each year.

- 70.36** Chapter 3, Water Resources section, has been changed to reflect this information.
- 70.37** For EIS purposes, the data given on page 58 of the Draft EIS Table 3-3 was used to analyze the flows. The probabilities were given in percent on page 95 of the Draft EIS.
- 70.38** The 547-acre figure for upland vegetation is correct for the area that would be inundated. The dam and spillway acreage would not be added to this figure because the inundated area and the area covered by the dam and spillway have been cited separately in the EIS.
- 70.39** Table 3-7 is designed to indicate a general habitat preference between riparian and upland. As stated in the table, bald eagles are only winter residents of the area. The habitat preference of the peregrine falcon is more riparian oriented than upland. The cliffs they nest on are most often associated with the edges of canyons adjacent to a riparian zone. Inasmuch as the table is not meant to be encyclopedic, it does not differentiate all the various types of preferred nesting habitat.
- 70.40** See Letter Responses 68.9 and 70.80.
- 70.41** Chapter 3 has been revised to reflect this information.
- 70.42** See the revised Aquatic Wildlife section of Chapter 3 in this Final EIS.
- 70.43** Because mayflies were not identified as a significant issue during the scoping and EIS development process, a lengthy discussion of their importance is not included in the Draft EIS. Reasons for low macroinvertebrate abundance were addressed in the discussion of producers (page 65 in the Draft EIS). The limiting factors are the same (i.e., high turbidities which reduce light penetration; high levels of scour because of a shifting sand bottom; and few riffles). Excessive flow fluctuations and sedimentation are additional factors affecting macroinvertebrate populations.
- 70.44** See Appendix 4 of this Final EIS for additional information about location of endangered fish collections.
- 70.45** Chapter 3 in this Final EIS has been revised as suggested.
- 70.46** Chapter 3 in this Final EIS has been revised as suggested.
- 70.47** Please see the revised Recreation sections of Alternative 1 in Chapters 3 and 4 of this Final EIS.
- 70.48** There have been no formal studies or surveys on deer hunting in the project area. Therefore, data on the amount of activity was based on estimates supplied by the BLM Vernal District, UDWR, and Bio-Resources. Because sources did not agree, a range of 100-240 hunting days per year was considered as the best available information.

- 70.49 Chapter 3, Hunting section, in this Final EIS has been changed to reflect this information.
- 70.50 Five mining claims (three was in error) would be affected by the proposed White River Dam and Reservoir; four mining claims would be affected by the Hell's Hole Canyon Dam Alternative. One of the claims in the Hell's Hole Dam Reservoir would be partially inundated; the remainder would be above the normal high surface level of the reservoir.
- 70.51 This subject has been partially expanded by Letter Response 4.8 and is illustrated in the Vegetation section, page 102 of the Draft EIS. Also, see the revised Impact section of Water Resources, Downstream from the Proposed Dam, in Chapter 4 of this Final EIS.
- 70.52 The outlet structure has been redesigned to meet the needs of native fish species, according to requirements in the FWS Biological Opinion. See Appendices 4 and 10 of this Final EIS.
- 70.53 We assume you are referring to the word "none". Your concerns about mitigation of wetlands and floodplains are addressed in the revised Mitigation section of Chapter 4 in this Final EIS. Also, see Letter Response 29.1.
- 70.54 In the paragraph you refer to, the acreages inundated at normal water surface elevation are used. Additionally, the number of acres inundated and the number of acres covered by the dam and spillway are referred to separately in the EIS. Please see Letter Response 70.29.
- 70.55 Please refer to Letter Response 4.9, second paragraph.
- 70.56 The figure of 1,982 in Table 4-1 of the Draft EIS was in error. This has been changed to 2,102 in the Introduction to Chapter 1 and also in Table 4-1 in this Final EIS. Please see Letter Response 70.29.
- 70.57 Exact wildlife populations are nearly impossible to pinpoint. The figure of 189 cottontails was the estimate BLM determined using UDWR and consultant data.
- 70.58 Your comment is noted and will be considered in the decision-making process.
- 70.59 Chapter 3, Birds section, in this Final EIS has been revised to reflect this information.
- 70.60 Chapter 3, Birds section, in this Final EIS has been revised as suggested.
- 70.61 Chapter 3 in this Final EIS has been revised as suggested.
- 70.62 Chapter 4 in this Final EIS has been revised.
- 70.63 Please see Appendix 10, FWS Technical Assistance Report, in this Final EIS for discussion of mitigation measures for goose nesting.

- 70.64 Chapter 4 in this Final EIS has been revised to reflect this information.
- 70.65 The FWS Technical Assistance Report (Appendix 10 in this Final EIS) indicates that impacts to bald eagles would be more or less neutral. Because there is a possibility of adverse impacts, the Impact section has been revised to indicate that, even though there may be adverse impacts, they would most likely be negligible. See Appendix 4.
- 70.66 A new prey base created by the ice-free tailwaters would offset the loss of winter roosting habitat which would be inundated by the reservoir. For more information, see Appendices 4 and 10 in this Final EIS.
- 70.67 According to the FWS Biological Opinion, should the White River Dam Project be implemented, the reservoir would be managed to sustain native fishes.
- 70.68 Your comment agrees with the mitigation discussed on pages 110-111 in the Draft EIS covering adverse impacts to Colorado squawfish. Warm water releases from the proposed White River Dam would not insure continued use of the White River by squawfish.
- 70.69 Chapter 4 in this Final EIS has been revised as suggested.
- 70.70 Other reservoirs in Utah also fluctuate and occasionally have water-fowl production. It is not expected that production would be significant, regardless of the reservoir fluctuation.
- 70.71 It should be understood that reductions in the Green River flows would vary only 1 to 3 percent if the 97 cfs for synfuel projects were taken from the Green River. The impacts of greater drawdown in Flaming Gorge Reservoir are diffused or minimized and are insignificant because of present dam operation procedures. Greater use of the Green River for this alternative would have very little effect on the overall water quality, velocities, or amounts released from Flaming Gorge Dam because about 800 cfs are presently being released. The Bureau of Reclamation is required to release at least 400 cfs. Until releases drop to the 400 cfs level, the 97 cfs required for this alternative would not be released as make-up water and thus would make no difference in flow regime or draw-down impact on Flaming Gorge Reservoir.
- 70.72 Chapter 4 in this Final EIS has been revised as suggested.
- 70.73 Yes, the number should be the same. However, this number has been revised in Table 4-13 of this Final EIS to  $1.1 \times 10^{11}$  based on 31.4 million kilowatts hours on an average annual basis.
- 70.74 Chapter 4 in this Final EIS has been revised as suggested.
- 70.75 Chapter 4 in this Final EIS has been revised to reflect this information.

- 70.76 Chapter 4 in this Final EIS has been revised as suggested.
- 70.77 Chapter 4 in this Final EIS has been revised as suggested.
- 70.78 Both of these species were purposely given a C-U designation because in some areas they are commonly seen, while in other areas (often a short distance away) they are uncommon.
- 70.79 Appendix 5 (Appendix 7 in this Final EIS) has been revised as suggested.
- 70.80 Although a few bald eagles come to the area each year one would not commonly expect to see them because of the small numbers. Therefore, the designation Uncommon was used.

## Comment Letter 71



IN REPLY  
REFER TO: UC-150  
120.1

### United States Department of the Interior

WATER AND POWER RESOURCES SERVICE  
UPPER COLORADO REGIONAL OFFICE  
P.O. BOX 11346  
SALT LAKE CITY, UTAH 84111

#### Memorandum

To: District Manager, Bureau of Land Management, P. O. Box F,  
Vernal, Utah 84078

From: Regional Director  
Water and Power Resources Service

Subject: Review of Draft Environmental Statement - White River Dam Project  
(DES 80-74)

This office has reviewed the above Draft Environmental Statement (DES) for the Water and Power Resources Service and has the following comments to offer:

- 71.1 1. The mitigation discussion on pages 112, 123, 128, and 129 infers that water from Flaming Gorge Reservoir could be released to make up for depletions in the Green River because of pumping to the White River Dam and Reservoir. Release of water from Flaming Gorge Reservoir would be provided for beneficial consumptive uses downstream based on contracts for the sale of water which would require the approval of the State of Utah and the Secretary of the Interior--the point being that water is available from the Flaming Gorge Reservoir for release assuming the proper institutional requirements have been met for the downstream use of water. The Service's position on this issue is that non-Colorado River Storage Project (CRSP) developments in the Upper Colorado River Basin should provide their own mitigation for impacts caused to endangered fishes, and the CRSP system should not be expected to or necessarily relied upon for the mitigation source.
- 71.2 2. The potential loss of power at Glen Canyon and other downstream plants because of depletions of water in the Upper Colorado River Basin attributed to the White River Dam Project should be discussed. We have this information and can make it available upon request.
- 71.3 3. The rate of sediment deposition that will occur in the White River Reservoir is a primary element in determining the life of this project. The discussion of sedimentation on page 22 of the DES seems inadequate and is unsubstantiated by the studies referenced. Crenney and Krasnowski (1980) summarize previous reconnaissance grade studies that estimated total sediment inflow rates ranging from 0.80 to 4.22 million tons per year. These authors also analyzed data collected during water years 1975 through 1978 and presented a sedimentation rate of 5.12 million tons per year.

71.3  
(cont.)

In the Hawkins (1980) study, a sediment inflow rate of 3.0 million tons per year was selected on the basis that it was "a convenient compromise from several other studies." The "several other studies" appear to be the early reconnaissance studies (0.80 to 4.22 million tons per year). The 3.12 million tons per year rate seems to have been disregarded entirely. The situation is made more unclear because the 1,273 acre-feet per year deposition rate shown on page 22 of the DES does not appear in either of the references. Additionally, the estimate of 33 years during which the 37,500 acre-foot inactive storage space would fill the sediment would instead appear to be 29 years.

Because of the importance of accurately determining the sedimentation rate of the reservoir to provide a confident estimate of the life of the project, we recommend that the question of sediment be much more fully addressed.

## 71.4

4. Salinity

a. The data presented for salinity impacts are not detailed enough to allow adequate confirmation of figures presented. It would be useful to present the assumptions made regarding salt loading, return flow, salt export, and timing of developments so that accurate calculation checks can be made.

b. Based upon data presented in the DES (assuming total containment of 70,000 acre-feet with a salt concentration of 460 mg/L), we estimate that the salinity increase at Imperial Dam would be 4.1 mg/L rather than 3.4 mg/L. This calculation should be rechecked.

c. Under the discussion of cumulative impacts, the DES presents an impact of 19 mg/L at Imperial Dam which appears to be low.

Table 4-14 does not include all of the features in the system which would affect depletions and salt loading. Further, the timing of all developments is critical in estimating impacts. This calculation should be rechecked.

d. Based upon 1980 prices, the cost of salinity at Imperial Dam should be \$450,000 per mg/L rather than \$430,000 per mg/L (page 98). The percentage of proposed project area surveys should also be included.

## 71.5

5. On pages 98-99, under the heading of "Reservoir Area," the temperature profile does not indicate that a thermocline by the definition of 1°C/meter is present for the White River Reservoir presumably predicted for mid-June. Furthermore, the U. S. Geological Survey gaging station for the White River near Watson, Utah, indicates that the peak flows of the season occurred in mid-June. The high flushing rate that would occur at peak flows and the temperature profile on page 99 indicate that the reservoir is being mixed throughout. Stagnation would therefore not be expected until at least July. Since 1975 was

71.5  
(cont.)

approximately an average water year at the Watson gage, this hydrograph probably is fairly representative. The data presented in the Draft Environmental Assessment do not support a hydraulic stagnation period of 100 days unless this prediction is meant to depict the worst case situation in a low water year. On the average, a 60-day stagnation period from July through August is probably more likely. The occurrence of anaerobic conditions probably is largely dependent on substantial blue-green Algae blooms in August and September. The reservoir is much more likely to experience dissolved oxygen problems with a multi-level outlet than with a bottom outlet, since the bottom outlet would create more vertical mixing.

## 71.6

6. In Appendix No. 1, under the Department of the Interior, an additional Federal authorizing action is required. If, as stated in the DES, water is to be obtained from the Flaming Gorge Reservoir, it must be done so through a water sales contract with the Service as approved by the Secretary of the Interior. The water sales contract action should therefore be identified, the approximate amount of water to be purchased indicated, the name or names of the party or parties with whom the contract would be executed, and the authority shown for selling the water which is the CRSP Act (P.L. 84-485).

We appreciate the opportunity to comment on this DES.

71.1 Thank you for the comment. This information will be considered in the decision-making process. See also Comment 71.6.

71.2 The loss of generation at affected downstream Colorado River hydro-power projects would total approximately 68,580,000 kilowatt hours per year (USDI, Bureau of Reclamation, 1981b). However, the Colorado River Storage Project was originally authorized with the understanding that, as water was put to beneficial consumptive uses in the Upper Colorado River Basin, there would be impacts on the amount of energy generated by these mainstem hydroelectric power plants.

71.3 Thank you for your comment. This information will be considered in the decision-making process. Estimating the amount of sediment that would accumulate in the proposed reservoir is a difficult task because of the variables involved. These include a deficiency in sediment data, particularly at high flows; the difficulty in defining a reliable mathematical relationship between water flow and sediment flow; difficulty in predicting the bulk density of reservoir sediment; and the trapping efficiency of the reservoir. Not all experts agree on the application of sedimentation forecast models and their interpretation to this project. In some instances, differences with quantification can be attributed to different locations of inflow sediment sampling.

An effort was made on July 15, 1980 in a meeting with BIO/WEST, Vaughn Hansen Associates, Utah State University, Utah Division of Water Resources, BLH, and other Federal and State agencies to develop and agree on a sedimentation forecast model. The methodology used and results obtained represent a worst-case analysis in the consensus opinion of the group. Therefore, the sedimentation analysis as outlined in the Draft EIS was considered to be the best available information. See Letter Responses 5.2, 27.27, 33.4, 49.7, and 70.25.

71.4 The analysis of salinity impacts in the Draft EIS was made with the best information available at the time. However, we concur with the calculations in your comment and the text in this Final EIS has been changed to reflect the 4.1 mg/l and 450,000 mg/l figures. Based on this information, the cumulative impacts at Imperial Dam could be higher than 19 mg/l. See Letter Responses 6.2, 64.6, and 70.5.

71.5 The word "thermocline" has been defined differently by various authors. In the White River EIS, thermocline refers to the maximum rate of temperature decrease in relation to depth, not necessarily 1° C per meter.

Stagnation prior to July is a matter of speculation. However, a 60-90 day stagnation period is considered reasonable.

The occurrence of anaerobic conditions is not dependent upon blue-green algae in August. The oxygen demand in the Draft EIS was based only on sediment oxygen demand, a best possible case. If one includes other possible sources of organics besides sediments, anaerobic conditions would easily occur earlier than August.

A bottom outlet would probably create more vertical mixing of water in the reservoir; however, such an outlet would also release only cold water. A study conducted by the U.S. Department of Defense, Army Corps of Engineers (1973) concluded that the deeper an outlet is placed in a

71.5 reservoir, the greater the portion of the reservoir that will contain adequate levels of dissolved oxygen for cold water fishes. This would improve the river for a cold-water fishery; however, the FWS official Biological Opinion requires management of the White River below the dam for the native fishes (see Appendix 4).

71.6 The additional Federal authorizing action, CRSP Act (P.L. 84-485), is included in Appendix 1 of this Final EIS.



# APPENDIX 1

## APPENDIX 1

### Federal and State Authorizing Actions Alternative 1 - White River Dam

Project Feature	Magnitude	Authorizing Actions	Authority
<u>Federal Authorizing Actions</u>			
Department of the Interior Bureau of Land Management			
Earth Dam, Ancillary Facilities, and Reservoir	2,377 ac.	a. Grant right-of-way.  or b. Sell public lands to State of Utah.  or c. State of Utah could select public lands.  or d. Exchange public lands for State-owned lands.	a. Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776 et. seq.).  b. Title II of Federal Land Policy Act of 1976 (90 Stat. 2750).  c. State Indemnity Grants 43 CFR 2621.0-3.  d. Title II of Federal Land Policy Act of 1976, Sec. 206 43 CFR 2210.
Power Transmission System (Routes)	49-76 ac.	Grant right-of-way.	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776 et. seq.).
Access Road	47-57 ac.	Grant right-of-way.	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776 et. seq.), Act of August 27, 1958 (72 Stat. 892, Title 23 USC Sec. 107).
Off-Site Construction Materials (Sand, Gravel, Clay, etc.)	882 ac.	a. Issue Temporary Use Permit for field investigations to locate suitable materials for dam construction.	a. Title V of Federal Land Policy and Management Act of 1976, Sec. 302 (90 Stat. 2778).

## Alternative 1 (continued)

Project Feature	Magnitude	Authorizing Actions	Authority
		b. Issue permit for mineral materials disposal.	b. The Materials Act of July 31, 1947, as amended by the Acts of July 23, 1955 and September 25, 1962 (30 USC 601, 602).
Miscellaneous Uses of Public Lands (storage of equipment, staging areas, other)	10 ac.	Issue Temporary Use Permit.	Title V of Federal Land Policy and Management Act of 1976, Sec. 302 (90 Stat. 2778).
Department of Defense <u>Army Corps of Engineers</u>			
Earth Dam and Ancillary Facilities		Grant 404 Permit for any proposal or alternative that would involve placement of dredged or fill materials in waters of the United States or their adjacent wetlands.	Federal Clean Water Act of 1977 (33 USC, 1251). Federal Water Pollution Control Act Amendment of 1972.
<u>Federal Energy Regulatory Commission</u>			
Hydroelectric Power Plant and Primary Power Transmission System		Issue license.	Federal Power Act of 1935 16 USC, Sec. 791(a) et. seq.
<u>Environmental Protection Agency</u>			
		a. Review and comment on EIS.	a. NEPA 1969, Section 309 of Clean Air Act.
		b. Review 404 permit application in conjunction with Army Corps of Engineers.	b. Section 404 of Water Pollution Control Act, as amended in 1972. Section 402 of Clean Water Act and Clean Air Act as amended.
		c. Issue NPDES Permit, if there is water discharged during dam construction.	c. Section 402 of Clean Water Act.

## APPENDIX 1 (continued)

### Alternative 1 (continued)

Project Feature	Magnitude	Authorizing Actions	Authority
<u>Rural Electrification Administration</u>			
Hydroelectric Facilities and 138-kV Transmission Line		Approval of loan guarantee for facilities purchase or construction approval of contracts.	Rural Electrification Act of 1936 (49 Stat. 1363; USC Chapter 31; 7 USC 901-950(6)).
<u>State of Utah Authorizing Actions</u>			
<u>Utah State Division of Lands</u>			
Power Transmission System (Routes)	15 ac.	Grant right-of-way.	Utah Code Annotated 1953, as amended 65-2-1.
Reservoir	672.83 ac.	a. Lease land. or b. Sell land. or c. Grant easement.	a. Utah Code Annotated 65-1-108. b. Utah Code Annotated 65-1-29. c. Utah Code Annotated 65-2-1.
<u>Utah State Division of Water Rights</u>			
Surface Water Sources (White River)	109,250 ac-ft	Approve Water Appropriation Applications filed by proponents of project.	Utah Code Annotated 73-3-1 through 73-3-28.
Earth Dam and Ancillary Facilities		Approve design of dam and ancillary facilities with reference to safety, etc.	Utah Code Annotated 73-5-5, 73-5-6, 73-5-7, 73-5-12.
<u>Utah State Department of Development Services Division of State History</u>			
Project Area	4,413.29 ac.	Issue Clearance Notice Concerning Cultural Resources.	Utah Code Annotated 63-18, 1966 Historic Preservation Act.

### Alternative 1 (continued)

Project Feature	Magnitude	Authorizing Actions	Authority
<u>Utah State Division of Environmental Health Bureau of Water Pollution Control</u>			
Project Area		Issue permit for discharge of waste water into state waters.	Utah Code Annotated 5573-14-5, 73-14-10.

### Local Authorizing Action

#### Uintah County, Utah

None.

# APPENDIX 1 (continued)

## Alternative 3 - Hell's Hole Canyon Dam

Project Feature	Magnitude	Authorizing Actions	Authority
<u>Federal Authorizing Actions</u>			
Department of the Interior Bureau of Land Management			
Earth Dam, Ancillary Facilities, and Reservoir	275 ac.	a. Grant right-of-way.  or b. Sell public lands to State of Utah.  or c. State of Utah could select public lands.  or d. Exchange public lands for State-owned lands.	a. Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776 et. seq.).  b. Title II of Federal Land Policy Act of 1976 (90 Stat. 2750).  c. State Indemnity Grants 43 CFR 2621.0-3.  d. Title II of Federal Land Policy Act of 1976, Sec. 206 43 CFR 2210.
Pumping Station and 0.5-Mile Pipeline	a. 3.5 ac.	a. Grant right-of-way.	a. Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776 et. seq.).
Power Transmission Line	b. 1.45 mi. (10.5 ac.)	b. Grant right-of-way.	a. Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776 et. seq.).
Access Road	c. 0.6 mi. (1.3 ac.)	c. Grant right-of-way.	a. Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776 et. seq.).

## Alternative 3 (continued)

Project Feature	Magnitude	Authorizing Actions	Authority
<u>State of Utah Authorizing Actions</u>			
<u>Utah State Division of Water Rights</u>			
Surface Water Sources (White River)	70,000 ac-ft <sup>a</sup>	Approve Water Appropriation Application filed by proponents of project.	
Earth Dam and Ancillary Facilities		Approve design of dam and ancillary facilities with reference to safety, etc.	Utah Code Annotated 73-5-5, 73-5-6, 73-5-7, 73-5-12.
<u>Utah State Department of Development Services</u> <u>Division of State History</u>			
Project Area	800 ac.	Issue clearance notice concerning cultural resources.	Utah Code Annotated 63-18, 1966 Historic Preservation Act.
<u>Local Authorizing Action</u>			
<u>Uintah County, Utah</u>			
		None.	

# APPENDIX 1 (continued)

## APPENDIX 1 (continued)

### Alternative 4 - Pumping From Green River

Project Feature	Magnitude	Authorizing Actions	Authority
<u>Federal Authorizing Actions</u>			
<u>Department of the Interior</u> <u>Bureau of Land Management</u>			
Pipeline, Pump Stations (3), Power Lines, and Access Road	361 ac.	Grant right-of-way.	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776 et. seq.).
Miscellaneous Uses of Public Lands (Storage of Equipment, Staging Areas, Other).	10 ac.	Issue Temporary Use Permit.	Title V of Federal Land Policy and Management Act of 1976, Sec. 302 (90 Stat. 2778).
<u>Bureau of Reclamation</u>			
Water From Flaming Gorge Reservoir	70,000 ac-ft	Water Sales Contract.	Colorado River Storage Project Act (P.L. 84-485).
<u>Environmental Protection Agency</u>			
		a. Review and comment on EIS.	a. NEPA 1969, Section 309 of Clean Air Act.
		b. Review 404 Permit Application.	
<u>State of Utah Authorizing Actions</u>			
<u>Utah State Division of Lands</u>			
Pipeline, Pump Stations, Power Transmission Lines, Access Roads	37 ac.	Grant right-of-way.	Utah Code Annotated 1953, as amended 65-2-1.
<u>Utah State Division of Water Rights</u>			
Surface Water Sources (White River)	70,000 ac-ft <sup>1</sup>	Approve Water Appropriation Applications filed by proponents of project.	Utah Code Annotated 737-3-1 through 73-3-28.

## Alternative 4 (continued)

Project Feature	Magnitude	Authorizing Actions	Authority
<u>Utah State Department of Developmental Services</u> <u>Division of State History</u>			
Project Area	425 ac.	Issue Clearance Notice concerning cultural resources.	Utah Code Annotated 63-18, 1966 Historic Preservation Act.
<u>Local Authorizing Action</u>			
<u>Utah County, Utah</u>			

None.

## APPENDIX 1 (concluded)

### APPENDIX 1 (continued)

#### Alternative 5 - Pumping From White River and Supplementing With Water Pumped From Green River

Project Feature	Magnitude	Authorizing Actions	Authority
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#### Federal Authorizing Actions

##### Department of the Interior Bureau of Land Management

Pipeline, Pump Station (7), Power Lines, Access Roads	391 ac.	Grant right-of-way.	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776 et. seq.), 43 CFR 2210.
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Miscellaneous Uses of Public Lands (Storage of Equipment, Staging Areas, Other)	10 ac.	Issue Temporary Use Permit.	Title V of Federal Land Policy and Management Act of 1976 Sec. 302 (90 Stat. 2778).
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##### Bureau of Reclamation

Water From Flaming Gorge Reservoir	70,000 ac-ft.	Water Sales Contract.	Colorado River Storage Project Act (P.L. 84-485).
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#### State of Utah Authorizing Actions

##### Utah State Division of Lands

Pipeline, Pump Stations, Power Transmission Lines, Access Roads	67 ac.	Grant right-of-way.	Utah Code Annotated 1953, as amended 65-2-1.
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##### Utah State Division of Water Rights

Surface Water Sources	70,000 ac-ft <sup>a</sup>	Approve Water Appropriation Applications filed by proponents of project.	Utah Code Annotated 73-3-1 through 73-3-28.
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Earth Dam and Ancillary facilities		Approve design of dam and ancillary facilities with reference to safety, etc.	Utah Code Annotated 73-5-5, 73-5-6, 73-5-7, 73-5-12.
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### Alternative 5 (concluded)

Project Feature	Magnitude	Authorizing Actions	Authority
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#### Utah State Department of Developmental Services Division of State History

Project Area	485 ac.	Issue Clearance Notice concerning cultural resources.	Utah Code Annotated 63-1b, 1966 Historic Preservation Act.
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#### Local Authorizing Action

##### Uintah County, Utah

None.

<sup>a</sup>This amount of water is presently informally committed; however, the State of Utah has applied for 250,000 acre-feet.

## APPENDIX 2

### APPENDIX 2

#### English-Metric Conversion Factors

Multiply	By	To Obtain
acres	.40469	hectares (ha)
cubic yards	.7646	cubic meters (m <sup>3</sup> )
feet	.3046	meters (m)
inches	2.540	centimeters (cm)
inches	25.40	millimeters (mm)
gallons	3.7854	liters (l)
miles	1.609	kilometers (km)
square miles	2.59	square kilometers (km <sup>2</sup> )
1,000 acre-feet/year	1.38	cubic feet/sec (cfs)

Note: To convert Fahrenheit to Centigrade:  $5/9 (F^{\circ} - 32)$

## APPENDIX 3

### APPENDIX 3

#### Background Information on Minimum Flow Releases

The BLM prepared the Draft EIS with the operation of the dam as proposed in the Utah Division of Water Resources' August 1979, "White River Dam Project Proposed Action Plan".

The applicant has since revised the original proposal (i.e., to release at least 250 cfs, or natural flows if less, as a minimum through the White River Dam outlet works) to the flows mentioned below.

Alternatives 3, 4, and 5 presented in this Final EIS were analyzed using the criteria presented in the Draft EIS. If one of these alternatives were selected, Section 7 consultation would be reinitiated with the Fish and Wildlife Service (FWS).

The February 24, 1982 Biological Opinion issued by the FWS for the White River Dam Project determined that streamflows necessary for the Colorado squawfish in the White River below the dam would be somewhat different than the flows proposed in the applicant's 1979 proposed action plan (see Appendix 4). Therefore, the applicant has proposed new operating criteria for the reservoir. The criteria are included below:

#### STATEMENT BY UTAH DIVISION OF WATER RESOURCES PROPOSING NEW OPERATION CRITERIA FOR THE WHITE RIVER RESERVOIR

To meet the streamflow in the White River below the White River Dam as requested by the Fish and Wildlife Service, the Utah Division of Water Resources is proposing the following criteria for the operation of the White River Reservoir:

The Utah Division of Water Resources agrees to the concept of different operating criteria for so-called (1) normal or wet, (2) dry, and (3) critically dry water years. This criteria would be finalized in joint meetings between the State of Utah and the Fish and Wildlife Service.

The basis for determining if a year is (1) normal or wet, (2) dry, or (3) critically dry would be by comparing the April-September streamflow forecasts made by the National Weather Service for the upcoming year with ranges of flow established from a streamflow frequency analysis of the 1931-1980 50-year period of record for the April-September data from the USGS Gaging Station - White River near Colorado-Utah State Line, Utah. Any new depletions of streamflow in Colorado would be subtracted from the forecasted streamflow in order to estimate the streamflow that would actually be in the White River at the State Line USGS Gaging Station.

The streamflow limits for the (1) normal or wet, (2) dry, and (3) critically dry years using the above criteria based on a Log Normal streamflow frequency analysis would be:

Operation Criteria	Probability % <sup>1</sup>	April-September Streamflow (Acre-Feet)
1) Normal or wet	0...80%	Greater than 235,000
2) Dry	80%...95%	235,000...175,000
3) Critically dry	95%...100%	175,000 or less

<sup>1</sup>The probability as a percent indicates the streamflow will equal or exceed the given amount. As an example, the April-September flow of the White River at the State Line will equal or exceed 175,000 acre-feet 95 percent of the time.

## APPENDIX 3 (continued)

### APPENDIX 3 (continued)

The Utah Division of Water Resources is proposing these ranges of streamflow be established for determining what is a (1) normal or wet, (2) dry or (3) critically dry year. Based on these numbers, 43 of the last 50 years would have been normal or wet, 4 dry and 3 critically dry. The critically dry years were 1934 (125,200 AF), 1965 (169,400 AF), and 1977 (97,700 AF).

#### (1) Normal or Wet Years

For years determined to be normal or wet, the Fish and Wildlife Service has asked for 250 cfs average monthly streamflow from August 1 to June 14 and 500 cfs average monthly streamflow from June 15 to July 31. They have further asked that during the 6-week period in June and July the project be operated such that it not cause the streamflow to exceed 700 cfs or drop below 300 cfs. (It should be understood that the reservoir normally fills in June and the Utah Division of Water Resources may have no way of limiting releases from the reservoir to 700 cfs during high runoff periods in June and July.) They also request that changes in releases not be greater than 100 cfs in any 24-hour period.

The Utah Division of Water Resources agrees to comply with the aforementioned requested streamflow by operating the reservoir such that it will release below the reservoir at least the minimum streamflow requested by the Fish and Wildlife Service when the inflow to the reservoir equals or exceeds the streamflow requested by the Fish and Wildlife Service.

When the inflow to the reservoir falls below the minimum streamflow requested by the Fish and Wildlife Service, the Utah Division of Water Resources will provide up to 5,000 acre-feet from inactive storage to augment the low streamflow as dictated by the Fish and Wildlife Service. (The proposed 5,000 acre-feet would be part of the inactive or future sediment storage. Studies indicate the storage would not be encroached upon by sediment for 35-50 years. A further condition on this storage is it may not be available in successive dry or critically dry years. Criteria for when this storage is available also needs to be finalized in joint meetings between the State of Utah and the Fish and Wildlife Service.)

#### (2) Dry Water Years

For years determined to be dry, the Fish and Wildlife Service has asked for 250 cfs average monthly streamflow from August 1 to June 14 and 375 cfs average monthly streamflow from June 15 to July 31. They have further asked that during the 6-week period in June and July the project be operated such that it not cause the streamflow to drop below 250 cfs. They also request that changes in releases not be greater than 100 cfs in any 24-hour period.

The Utah Division of Water Resources agrees to comply with the aforementioned requested conditions and streamflows by operating the reservoir such that it will release below the reservoir at least the minimum streamflow requested by the Fish and Wildlife Service when the inflow to the reservoir equals or exceeds the streamflows requested by the Fish and Wildlife Service.

When the inflow to the reservoir falls below the minimum requested by the Fish and Wildlife Service, the Utah Division of Water Resources will provide up to 5,000 acre-feet from inactive storage to augment the low streamflow as dictated by the Fish and Wildlife Service.

### APPENDIX 3 (continued)

#### (3) Critically Dry Water Years

For years determined to be critically dry, the Fish and Wildlife Service has recognized that streamflows may fall below 250 cfs and has asked that the amount of streamflow released be jointly determined in meetings between the State of Utah and the Fish and Wildlife Service. The Fish and Wildlife Service has requested the releases be based on the project water year and reservoir storage.

The Utah Division of Water Resources concurs in the idea of a joint meeting to make the best possible decisions of water management during drought periods. The Utah Division of Water Resources would operate the reservoir such that it will release below the reservoir at least the amount determined in meetings between the State of Utah and Fish and Wildlife Service when the inflow to the reservoir equals or exceeds the agreed upon streamflow.

When the inflow to the reservoir falls below the minimum streamflow determined in the meetings, the Utah Division of Water Resources would provide up to 5,000 acre-feet from inactive storage to augment the low streamflow as dictated by the Fish and Wildlife Service."

#### Hydropower Generation

The applicant's proposal is based on its plan to construct a hydroelectric power plant associated with the dam. The outlet works would consist of two pipes through the dam, a 10-foot diameter penstock, and a 3-foot diameter bypass pipe. The proposed 15-MW hydroelectric power plant would be designed to produce power from minimum releases of 250 cfs to maximum releases of 2,000 cfs, under a minimum head of 82 feet and a maximum head of 129 feet.

The applicant has changed its proposed releases for hydroelectric power from the 250 to 600 cfs range in the "Proposed Action Plan" to the 250 cfs to 2,000 cfs range shown above. An analysis of the computer simulation of each of these proposed releases shows the only difference is that less water would be spilled. The proposed river flow below the project would be unchanged.

The analysis of the computer simulation indicates the hydroelectric power plant would generate approximately 44.5 million kWh annually with the proposed development. The power plant would generate approximately 31 million kWh if Colorado depleted as much as 100,000 acre-feet above the proposed project.

Based on the Biological Opinion, the proposed power plant design, and the new operating criteria, the BLM has accepted the release proposed for White River Dam for use in this Final EIS.

These minimum flows have not changed the impact analysis of the estimate of the environmental consequences providing that the operation of the dam and the conservation measures provided in the Biological Opinion are adhered to, should the White River Dam Project be approved and project features constructed.

#### Ute Indian Water Rights

During the 1980 Budget Session of the Utah State Legislature, a Bill was passed which endorsed a Ute Indian Water Compact. This proposed compact between the Ute Indian Tribe of the Uintah and Ouray Reservation, Utah, and the State of Utah was authorized and approved by the State of Utah; however, as of this date (January 1992), it has not been ratified by the Ute Indian Tribe.

## APPENDIX 3 (concluded)

### APPENDIX 3 (concluded)

The compact, recognizing the Winters Doctrine concerning Ute Indian water rights on the White River in Utah, would allocate and provide for delivery of water at a diversion point or points within the Indian Reservation (downstream from the proposed dam). The following quantities of water would be diverted from the river for use on the Reservation, provided the natural river flows equal or exceed the amounts indicated:

<u>Month</u>	<u>Acre-feet per Month</u>	<u>cfs per Month</u>
April	2,041	34.3
May	10,589	172.2
June	13,644	229.3
July	13,491	219.4
August	12,181	198.1
September	7,573	127.3
October	2,079	33.8
Total	61,598	

The above water allocations were developed by the Utah State Engineer and became part of the proposed compact between the State of Utah and the Ute Indian Tribe. These proposed water allocations may change, depending on the final agreement between the State of Utah and the Ute Indians. Under present conditions, the Ute Indian water right has exceeded the flow of the river during drought periods.

## APPENDIX 4

### APPENDIX 4

#### FWS BIOLOGICAL OPINION

This appendix includes: (1) the Fish and Wildlife Service's (FWS) official Biological Opinion; (2) an amendment to the Opinion received from the FWS; and (3) comment letters received from the public concerning the Opinion.

The Utah Division of Water Resources, BLM, and FWS felt that impacts to endangered fish species by the proposed White River Dam Project could not be adequately assessed without additional studies. Therefore, the Final EIS on the White River Dam Project was delayed for about 1 year to allow the FWS to complete these studies.

After receiving the Biological Opinion, BLM distributed copies to interested and affected agencies and individuals. Comments received on the Biological Opinion prior to April 15, 1982 are included in this appendix and will be considered in the decision-making process.

# APPENDIX 4 (continued)



## United States Department of the Interior

BUREAU OF LAND MANAGEMENT  
VERNAL DISTRICT OFFICE  
170 South 500 East  
Vernal, Utah 84078

March 2, 1982

Dear Interested Citizen:

On November 26, 1980, a draft environmental impact statement was circulated that discussed the threatened, endangered, and sensitive species in the White River Dam Project impact area. That discussion disclosed that the Section 7 consultation (biological opinion procedure) with the U S Fish and Wildlife Service would continue through the 1981 field study period in order that more data on the endangered fish species could be collected for the biological opinion. This would allow for a more thorough environmental analysis in the final environmental impact statement. Because the biological opinion was not available for public review in the draft environmental impact statement, the BLM is making it available now for your review in advance of receiving a copy of the final environmental impact statement.

Enclosed is your copy of the White River Dam Biological Opinion. Additional copies of the opinion can be obtained from the BLM Vernal District Office, 170 South 500 East, Vernal, Utah 84078 (or phone Lloyd Ferguson, District Manager or Curtis Tucker, Environmental Specialist at (801) 789-1362), or from the BLM Utah State Office, 136 East South Temple, Salt Lake City, Utah 84111 (or phone Thom Slater at (801) 524-5645).

BLM will accept all comments on the biological opinion. However, to be published in the final environmental impact statement on the proposed White River Dam, comments on the biological opinion must be provided to BLM by April 15, 1982. Such comments should be sent in writing to Lloyd Ferguson, BLM Vernal District Manager, at the above address. Any other comments received subsequent to April 15, 1982, will not be published in the EIS but will be considered in the decision making process scheduled for early summer of 1982.

Sincerely,

*Lloyd Ferguson*  
District Manager

Enclosures: 1  
Biological Opinion



## United States Department of the Interior FISH AND WILDLIFE SERVICE

MAILING ADDRESS  
Post Office Box 2548  
Denver Federal Center  
Denver, Colorado 80225

STREET LOCATION  
134 Union Blvd.  
Lakewood, Colorado 80226

IN REPLY REFER TO:

FA/SE/BLM-White  
River Dam (6-5-80-F-222)

FtB 2 4 1982

### MEMORANDUM

To: State Director, Utah State Office  
Bureau of Land Management, Salt Lake City, Utah

From: Regional Director, Region 6  
Fish and Wildlife Service, Denver, Colorado

Subject: Biological Opinion - White River Dam Project, Utah

We prepared this biological opinion in response to your February 29, 1980, request for consultation as well as your August 13, 1980, request for an extension of the consultation period for the White River Dam Project (WRDP) proposed for construction south of Bonanza, Utah. The Utah State Division of Water Resources (DWR) proposes to construct the project largely on land administered by the Bureau of Land Management (BLM). BLM's issuance of appropriate rights-of-way is required.

This opinion has been prepared as prescribed in the Section 7 Interagency Cooperation Regulations, 50 CFR 402, and the Endangered Species Act (ESA), 16 USC 16 et seq. Data sources and information referenced herein are part of the administrative record of this opinion and are located in the U.S. Fish and Wildlife Service's (FWS) Salt Lake City Area Office.

### BIOLOGICAL OPINION

Operation of the WRDP as described below, which includes conservation measures designed to aid in the survival and recovery of the Colorado squawfish (*Ptychocheilus lucius*), is not likely to jeopardize the continued existence of the bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus anatum*), Uintah Basin hookless cactus (*Sclerocactus glaucus*), humpback chub (*Cila cypha*), bonytail chub (*Cila elegans*), or the Colorado squawfish.

### PROJECT DESCRIPTION

The DWR proposes to construct and operate a dam and reservoir on the White River southwest of Bonanza in Uintah County, Utah.

## APPENDIX 4 (continued)

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The reservoir would be about 13.5 miles long (maximum width of 0.7 miles) and would inundate 1,980 surface acres when filled to capacity. The reservoir would have an active storage capacity of 70,700 acre-feet (af) and a sediment reserve capacity of 38,550 af, for a total of 109,250 af. The dam, located on the White River about 50 miles upstream from the confluence of the Green and White Rivers, would be constructed of earth- and rock-fill materials and would be approximately 129.5 feet high and 2,700 feet long. A 15-megawatt hydroelectric plant would be constructed near the downstream toe of the dam. An estimated 29 million kilowatt hours would be generated from the plant on an average annual basis. A 138-kilovolt power transmission line would transmit power from the hydroelectric plant to the Moon Lake Bonanza power plant. This route would be about 10.5 miles long and 60 feet wide and would require approximately 77 acres of right-of-way.

The primary project purpose is to provide water for energy development, principally related to oil shale development and thermal power. Water rights would be retained by the State of Utah and made available for purchase. The potential users would build their own pumping stations and delivery systems. Approximately 75,000 af (104 cubic feet per second (cfs)) of water is being considered for sale to known users. The average annual evaporation loss from the reservoir would be approximately 5,500 acre-feet. This would result in a total of 80,500 af (111 cfs) of water being taken from the White River annually. The State of Utah has filed to appropriate a maximum of 250,000 af (345 cfs, approximately one half of the annual yield of the White River) of water from the White River. Conceivably this volume of water could ultimately be consumed yearly. However, since only approximately 80,500 af per year (111 cfs) is the expected depletion at this time, it is this volume which will be considered in this opinion. In addition, the 80,500 af (111 cfs) volume is the level which BLM is assessing in its final Environmental Impact Statement (EIS).

Minimum releases at the dam are expected to be 250 cfs (181,000 af) except in extremely dry years. This release is for power generation and downstream requirements of Tosco Oil Shale Company and the Uintah-Duray Indian Reservation. A minimum release of 50 cfs (36,200 af) would bypass the Indian diversion which is about 15 to 20 miles above the confluence with the Green River. In most years, releases are expected to exceed this amount by approximately 100 to 300 cfs (72,400 to 217,200 af).

The only action discussed in this biological opinion is the applicant's proposed project. The draft EIS (DEIS) prepared by BLM discusses four alternatives to the White River dam and reservoir. If one of the alternatives other than the proposal addressed in this opinion is selected, Section 7 consultation should be reinitiated. Additionally, should information

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become available in the future which was not available at the time of this consultation and which may show additional adverse impacts to listed species that was not considered in this biological opinion, Section 7 consultation should be reinitiated.

### PROJECT IMPACTS TO THE AQUATIC ENVIRONMENT

The White River near the Colorado-Utah State line (Watson gage) had an average annual discharge of 502,800 af (695 cfs) during the period 1923-1978. The lowest annual flow of record was 223,000 af (308 cfs) in 1977. Mean monthly flows in the late spring (peak flows) range from approximately 724,000 to 1,448,000 af (1,000 to 2,000 cfs).

Based upon flow information that was provided by the applicant and modeled by the FWS Instream Flow Group, the project would reduce flows of the White River, as indicated by percent of flow reduction, at two locations below the dam during June, July, August, and September (critical months for squawfish reproduction and rearing) in the following chart:

	Green River Confluence		Below Dam To Mtn. Fuel Bridge*	
	Mean <sup>1</sup> Monthly flow (cfs)	% flow <sup>2</sup> reduction	Mean Monthly flow (cfs)	% flow reduction
June	1564	13%	1717	5%
July	448	28%	586	9%
August	197	45%	333	14%
September	228	40%	303	12%

<sup>1</sup>Based upon the period from 1960-1980

<sup>2</sup>These figures are based upon the dam being operated between 250 and 2000 cfs with full downstream use (as outlined in the BLM DEIS).

\*Mountain Fuel Bridge - In the White River 21.3 miles from the confluence of the Green River.

During the period between 1963 and 1978 (after the closure of Flaming Gorge Dam) the Green River near Green River, Utah, had an average annual flow of 3,990,688 af (5512 cfs). This location near Green River, Utah is 120 miles up the Green River from its confluence with the Colorado River. The lowest annual flow during this period was 1,662,600 af (2,300 cfs) in 1963 and the highest was 5,388,300 af (7,429 cfs) in 1973. The lowest monthly flow was 47,500 af (66 cfs) recorded in October 1964.

# APPENDIX 4 (continued)

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Based upon flow and release information that was provided by the applicant, and modeled by the FWS Instream Flow Group, the project would reduce flows of the Green River (directly below the confluence of White and Green Rivers) during June, July, August, and September by:

	Mean (cfs) <sup>1</sup> Monthly Flow	% Flow reduction <sup>2</sup>
June	12,297	2%
July	5,052	4%
August	3,138	5%
September	2,683	5%

<sup>1</sup> Based upon period from 1964-1979

<sup>2</sup> Based upon the dam being operated between 250 and 2000 cfs with full downstream White River use.

Table 1 and Table 2 present information on the predicted changes in mean monthly temperatures in degrees centigrade (°C) at certain projected flows (in cfs) for various locations on the Green and White Rivers for the months of May, June, July, and August, as a result of the operation of the proposed White River dam. These locations include the Watson gage which is near the Colorado-Utah State line, the Mountain Fuel bridge which is 21.3 miles from the confluence of the Green river and the mouth of the White River. The tables show that WRDP can be operated in a manner which will not significantly alter the temperature regime below the proposed dam. Therefore, water temperature changes that result from the proposed dam can be regulated in a way that should not affect a suspected spawning area located 15 miles below the proposed dam. The flows shown are based upon various operating conditions of the White River dam.

Table 1. Expected changes in temperature (°C) at three locations on the White River at various flows (cfs).

	Flow	Temp. at Watson	Temp. at Mtn. Fuel	Temp. at Mouth
Mean (present)	1273	11.2	13.6	16.4
May	1987	18.3	17.8	17.6
	1490	18.3	17.6	17.4
	993	18.3	17.3	17.1
	2484	18.3	17.9	17.7
Mean (present)	1800	15.3	16.9	17.5
June	506	18.3	19.2	19.3
	397	18.3	19.3	19.4
	298	18.3	19.3	19.4
	795	18.3	19.1	19.3
Mean (present)	970	20.1	21.5	21.9

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July	397	18.3	21.9	22.2
	298	18.3	22.1	22.2
	198	18.3	22.2	22.3
	596	18.3	21.5	21.9
Mean (present)	465	18.9	20.4	20.6
August	298	18.3	20.5	20.7
	198	18.3	20.6	20.7
	99	18.3	20.6	20.7
	496	18.3	20.3	20.5

Table 2. Expected changes in temperature (°C) at Green River, Utah at various flows (cfs).

	Flow	Temp. at Green River, Utah
Mean (present)	11,382	13.2
May	12,096	13.8
	11,599	13.6
	11,102	13.4
	12,592	13.9
Mean (present)	13,193	16.7
June	11,989	16.7
	11,790	16.6
	11,691	16.6
	12,188	16.7
Mean (present)	7,271	21.1
July	6,699	21.1
	6,599	21.1
	6,500	21.1
	6,897	21.1
Mean (present)	3,526	19.9
August	3,359	19.9
	3,259	19.9
	3,160	19.9
	3,557	19.9

Annual sediment yield of the White River at its confluence with the Green River would be reduced an average of 55.5 percent. This would cause an average annual reduction in silt load of the Green River at the town of Green River, Utah, of 10.2 percent. This will probably have a beneficial effect on the suspected spawning area mentioned earlier. Releases from the dam would be nearly sediment-free for several years (Clyde 1980). Construction and operation of the dam would modify downstream channel morphology in the White River over a period of years.

It is estimated that the proposed project would result in an increase of salinity of 3.4 milligrams per liter (mg/l) downstream at Imperial Dam, California (Clinton 1980). The preferred concentrations of squawfish range between 600 and 1100 mg/l. Laboratory studies indicate that

## APPENDIX 4 (continued)

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squawfish completely avoid concentrations greater than 4600 mg/l. Therefore, this increase will not adversely affect the fishes. Projections of other downstream water quality characteristics as a result of the dam are uncertain.

Both the Green and Colorado Rivers have experienced significant peak flow reductions due to existing reservoir operation and an overall depletion in water for various purposes. Peak flow levels, magnitude, and duration primarily determine river morphology and habitat conditions. Peak flows have been drastically reduced in the Colorado River system resulting in sediment buildup in certain areas, water temperature changes, and other chemical changes in the River system (FWS 1982). The proposed White River dam would change the peak flow regime of the White River during spring runoff by greatly reducing the amount of water reaching the Green River during this time period. This will further add to the chemical and physical changes occurring in the Green River.

To increase knowledge of the Colorado River endemic (primarily the listed species) fishes' habitat requirements, a Colorado River Fishes Investigation Team was established in April 1979. This team is staffed with FWS personnel and received funding from the FWS, BLM, and the Bureau of Reclamation (BR). Other participants were the Utah Division of Wildlife Resources (DWR) and the Colorado Division of Wildlife. The major objective of the team's study was to learn additional life history requirements of the listed fishes. Under our funding agreement with BR and BLM, most of the field work was in the Colorado River system where impacts from BR and BLM projects were the greatest. Information obtained during the study via field, laboratory, and hatchery work has made it possible to provide recommendations in this opinion to maintain and develop more favorable habitat for the listed fishes.

### BASIS FOR OPINION COLORADO SQUAWFISH

Early records indicate that the Colorado squawfish was once found throughout the Colorado River system from the upper Green River in Wyoming to the Gulf of California, including the Gila River basin in Arizona. It was abundant over all of its range prior to the 1850's (Seethaler 1978).

The present range of the Colorado squawfish is restricted to the Upper Colorado River Basin and the number of this species is declining. It is found inhabiting about 360 miles (mi) of the mainstem Green River, from the mouth of the Yampa River to its confluence with the Colorado River. Its range extends 105 mi up the Yampa River and 136 mi up the White River, tributaries to the Green River. In the mainstem Colorado River it is found from above Lake Powell extending about 200 mi upstream and from the lower 30 mi of the Gunnison River, a tributary to the mainstem Colorado River. Approximately 80 mi of known squawfish habitat above the proposed dam site (about 10% of the total known squawfish habitat)

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will be adversely affected due to the WRDP, primarily because the dam may physically block seasonal movement of squawfish in and out of this 80-mile section of habitat above the proposed dam. In addition, at least 14 mi of riverine habitat will be converted to lentic habitat.

Studies in the White River have documented occurrence of squawfish in several locations. There are unsubstantiated reports of squawfish that were commonly caught by hook and line in the 1940's from the bridge across the White River near Bonanza, Utah (Seethaler 1978). Several adult squawfish were observed or collected in the upper White River in Colorado (near Piceance Creek) in the late 1960's (May 1970) and in 1977 (Prowitt et al. 1978). Six adult squawfish were captured and at least seven others observed in the lower 12 mi of the White River in July and September of 1978. Two squawfish were captured in the White River 29 mi and 42 mi above the mouth in May and June 1979, respectively (Lanigan and Berry 1979). Two squawfish were found in Colorado 52 mi upstream from the Utah border in 1978. The Colorado Division of Wildlife collected one adult squawfish about 122 mi up the White River in 1980 and collected one adult squawfish and saw one other 136 mi up the White River in 1981 (Personal Comm. with Ed Wick, February 1, 1982). Squawfish have been found consistently in the Green River at the mouth of the White River.

In the only intensive systematic study carried out in the White River, during the 1981 field season, the FWS collected 51 Colorado squawfish, of which 37 (72%) were adults over 400 millimeter (mm) total length (TL) and 14 (27%) were juveniles ranging in size from 60 to 400 mm TL. Only 17 of these 51 squawfish (33%) were collected above the proposed dam site. The upper range of distribution appears to be 134 mi up to the White River. No young-of-the-year (YOY) squawfish have been collected in the White River.

Decline in populations of Colorado squawfish correlates very closely with the construction of dams and reservoirs and the removal of water from the Colorado River system. Colorado squawfish evolved in and apparently require habitat conditions typified by great seasonal fluctuations in flow, high turbidity and silt load, and warm summer temperatures. Additionally, it appears that the Colorado squawfish requires relatively unrestricted movement to satisfy their migration needs. Movement of adult Colorado squawfish appears to be related to flow, temperature, feeding and spawning behavior. Movement and spawning migrations have been documented by tagging and radio-tracking programs (FWS 1982). A potential movement between the White and Green Rivers is indicated by the capture of a large number of squawfish at the mouth of the White River, the recapture of a squawfish in the lower White River tagged in the Green River, and the movement of two radio-tagged fish between the Green and lower White Rivers. In addition, one radio-tagged squawfish moved from the lower White River into the lower Green River and returned back into the lower White River, traveling almost 400 mi from May 29 to October 7, 1981, when contact was lost.

## APPENDIX 4 (continued)

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In the White and Yampa Rivers upstream and downstream movement occurs in association with spawning. There is evidence of homing behavior with some radio-tagged fish returning to areas where they were originally tagged following extensive migration (FWS 1982).

FWS (1982) concluded from collections of larvae and YOY Colorado squawfish below suspected spawning sites that there is a downstream drift of larvae and YOY following hatching. This movement can be any distance from a few miles (1-10 mi) to many miles (up to 100 mi). There is also evidence that, after their first year, some juvenile fish may move progressively upstream to areas of better feeding including lower sections of tributary streams.

Apparently, natural spawning of squawfish occurs between 20 and 22°C. Spawning both in the hatchery and in the field occurred between June 15 and July 15. At 13°C, egg mortality was 100% in a controlled test. At 16 to 18°C, development of the egg is slightly retarded, but hatching success and survival of larvae were higher. At 20 to 26°C, development and survival through the larval stage were up to 95% (FWS 1982). Juvenile temperature preference tests showed preferred temperature that ranged from 21.9°C to 27.6°C with an estimated final preference of 24.6°C, which was approximately the same as that for adults.

To complete its life cycle, the Colorado squawfish requires water temperatures of 20 to 28°C from mid-June to October. A temperature of about 20°C is required for spawning while temperatures that are near 24°C, the preferred temperature, are needed for optimal development and growth of young (FWS 1982).

Although no Colorado squawfish spawning has been documented in the White River, a potential spawning site with characteristics similar to a known site on the Yampa River exists about 15 miles below the proposed dam site. A radio-tagged squawfish was tracked to River Mile 34 of the White River on July 16, 1980, where apparent spawning behavior was observed on a riffle (FWS 1982). The significance of this is that there is only one known squawfish spawning site in the upper Colorado River basin (lower 20 mi of Yampa River). A key to preserving the Colorado squawfish is the preservation of the integrity of its spawning site and the maintenance of conditions conducive to egg survival (FWS 1982).

The proposed WRDP, without the conservation measures, would adversely alter habitat characteristics in the White River believed essential for continued existence of the Colorado squawfish. The project would reduce peak spring flows, reduce turbidity and silt load, and reduce annual flows.

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The project could potentially isolate those squawfish above the dam site, preventing these fish from migrating. Conversion of a lotic habitat into a lentic habitat, via the construction of the proposed reservoir, would create habitat favorable for non-native fish species resulting in decreased habitat for the native species. This apparently will not adversely affect the adult life stage as adults in good condition have been collected in Lake Powell. This could potentially contribute to the further proliferation of non-native fish species in the upper Colorado River basin. However, if a reservoir fishery using native fish is established (see number 4 of conservation measures), this should not happen.

It is our opinion that the WRDP will not significantly alter the temperature regime below the proposed dam. In fact, the water released from the dam will likely be warmer in May and June than is presently recorded in the White River and the change may be beneficial to squawfish.

The White River is one of two tributary streams in the Green River Basin still considered acceptable habitat for squawfish. The other suitable remaining tributary is the Yampa River. Other historically important tributaries have been so altered that they no longer receive significant use from squawfish. Alteration of the upper mainstem Green River by Flaming Gorge Reservoir has increased the importance of the major tributaries. The relatively natural flows of major tributaries entering the Green River below Flaming Gorge help to ameliorate the effects of that reservoir. In light of the above, the WRDP would have been likely to jeopardize the continued existence of the Colorado squawfish without changes to the project that have been agreed to as is discussed in the Conservation Measures section of this opinion.

### HUMPHACK CHUB

The only major populations of humpback chub conclusively known to exist in the upper Colorado River basin are located in Black Rocks (river mile 135-137) and Westwater Canyons (river mile 116-124) on the main Colorado River. Incidental captures were recorded from Cataract Canyon; throughout Gray and Desolation Canyons on the Green River; and at the lower end of Cross Mountain Canyon and in Yampa Canyon on the Yampa River. Populations of indistinct taxonomy were identified near Coal Creek in Lower Gray Canyon and in DeBeque Canyon (river mi 195-197) on the main Colorado River (FWS 1982).

Since the WRDP will not have any significantly measurable effect on the Green River at the sites where known humpback chub populations occur, in our opinion, the proposed project is not likely to jeopardize the continued existence of the humpback chub.

## APPENDIX 4 (continued)

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### BONYTAIL CHUB

The only recognized pure population of bonytail chub occurs in Lake Mohave, Arizona (FWS 1982). Since the WRDP will not have any significant effect on the lower Colorado River basin, in our opinion, the proposed project is not likely to jeopardize the continued existence of bonytail chub.

### BALD EAGLE

The bald eagle occurs in the project area mainly as a winter resident and a spring and fall migrant. Bald eagles congregate at specific wintering sites in Utah from late October through March. Open water on the White River during spring and fall attracts eagles because of fish and waterfowl availability. Deer carcasses along the riparian zone and rabbits on the nearby uplands provide additional food. The eagles also roost in the cottonwood trees along the river.

Fewer than six eagles were observed in the project area during a DWR survey during 1975-76. Approximately eight eagles were observed during a DWR and BLM helicopter flight on January 30, 1978. Fifteen eagles were observed in the project area during a survey on April 1, 1980. Eagle use along the White River, in winter, is marginal because the river is usually frozen over, reducing prey availability. We suspect that the period of highest eagle use in the project area occurs during spring migration. Canada geese and other waterfowl populations increase in the spring, offering eagles an additional food supply.

It is doubtful the proposed WRDP would produce benefits for the bald eagle. The White River between the proposed dam and the confluence with the Green River may provide more open water in the winter, but this potential benefit would be largely offset by loss of riparian habitat inundated by the reservoir. Habitat suitable for wintering bald eagles should contain large open perch trees near adequate food supplies. Many reservoirs in Utah and Colorado lack these requirements and use by eagles is minimal. We do not expect the soils surrounding the high water mark to support cottonwood trees; therefore, the relatively treeless shoreline would reduce the value of the area for bald eagles. Moreover the White River Reservoir would often be frozen over during winter, offering little prey for eagles. The reservoir surface still may be frozen in late March when most bald eagles have left Utah. Consequently, an ice-free reservoir in the spring would provide fishing and foraging for stragglers only.

The proposed project is not likely to jeopardize the continued existence of the bald eagle because no nesting birds are involved, and because the species has broad winter habitat requirements, and is an opportunistic feeder. Additional riparian habitat occurs above and below the project impact area. However, the loss of 13.5 miles of riparian habitat would

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be part of a cumulative loss of eagle habitat along the White River. Future energy exploration and development will place further demands on river water, contributing to the loss of additional riparian habitat. Therefore, recommendations are later discussed which will contribute to the conservation of the bald eagle.

### PEREGRINE FALCON

Populations of the peregrine falcon sharply declined in the 1940's, and the species has disappeared as a wild breeding bird east of the Mississippi River. At least 60 pairs of peregrines nested in Utah in the early 1940's, but only two pairs were known to have nested in the State in 1979.

Conditions in the project vicinity appear favorable for nesting falcons, and DWR considers habitat along the White River to be suitable for falcons. The segment of the river to be inundated has extensive precipitous cliffs and the riparian habitat offers a variety of prey. Nevertheless, DWR surveys of the area have not revealed evidence of nesting peregrines. Consequently, in our opinion the proposed project is not likely to jeopardize the continued existence of the peregrine falcon.

### UTAH BASIN HOOKLESS CACTUS

This cactus species occurs on gravelly soils of hills and mesas in desert shrub communities from 4,000 to 6,000 feet in Duchesne and Uintah Counties. No populations of this cactus are known in the project impact area; however, suitable habitat exists near the proposed reservoir site. Consequently, a BLM sponsored botanical survey for this and other plant species was conducted on the area in 1980, and none were found.

### RECOMMENDATIONS FOR BALD EAGLES

Section 7(a)(1) of ESA states that all Federal agencies shall utilize their authorities by carrying out programs for the conservation of endangered and threatened species. The following will help with the conservation of bald eagles.

The main objective in managing wintering bald eagles is to provide them with suitable habitat so they can return to the breeding range in healthy condition. Suitable winter habitat involves maintaining adequate food supplies, and protecting roost sites from human development and disturbance. We recommend that cottonwood stands below the dam be maintained. Furthermore, we recommend planting of cottonwood trees along the shoreline where soil and water conditions favor their development.

Because eagle electrocutions are a serious problem in Utah, electrical distribution lines, especially those between 4 kilovolt and 69 kilovolt should be constructed according to specifications in the 1973 manual "Suggested Practices for Raptor Protection on Powerlines."

## APPENDIX 4 (continued)

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### CONSERVATION MEASURES FOR THE COLORADO SQUAMFISH

The following conservation measures have been incorporated as a part of the project by the State of Utah and are being considered as project features in this opinion. The State of Utah will provide funding and/or equivalent resources to insure that the following conservation measures are implemented. Specific details on time frames, funding, and responsibilities will be contained in a memorandum of agreement entered into by appropriate officials of the State of Utah and Department of the Interior and such agreement will be reached prior to any physical construction activities.

1. Operation of the dam.
  - a. The applicant has designed the outlet works of the dam to allow water to be released from four different levels in the reservoir. Using this design feature, the applicant will insure that release water from the dam will approximate natural temperatures from the White River entering the reservoir for any given period of time. Between June 15 and July 31, the minimum daily temperature of the release flow will be at least 19°C. The temperature model provided by the State of Utah depicted that temperatures in this range could be adhered to.
  - b. Beginning with the reservoir filling period and continuing after the reservoir begins operation, annual meetings will be held between the FWS and the State of Utah. The purpose of these meetings will be to determine the operating criteria for the project facilities annually, including the release of water from the reservoir to meet the needs of the Colorado squawfish that are described below. These stream flow releases shall be determined by taking into account all stream flow forecasting information capabilities available in keeping with the advanced "State of the art." The State of Utah shall use information provided by DWR, FWS, and BLM to provide the agreed upon releases for squawfish.

Information analyzed to establish key flow needs were: stream flows supplied by the State of Utah, hydraulic analysis of key flow years (1977-1981), flow hydraulic simulation modeling developed by the FWS Instream Flow Group, FWS Coordination Act Report, and 1+ years of extensive field work. Operating criteria for flow releases will be based upon (1) normal or wet, (2) dry, and (3) critically dry water years. Based upon flows established from a stream flow frequency analysis of the 1931-1980 50-year period of record from the U.S. Geological Survey gaging station on the White River near the Colorado-Utah State line, the stream flows for the (1) normal or wet, (2) dry, and (3) critically dry years using the above criteria based on a Log Normal stream flow frequency analysis would be:

- |                   |                         |
|-------------------|-------------------------|
| 1) Normal or wet  | Greater than 235,000 af |
| 2) Dry            | 235,000 to 175,000 af   |
| 3) Critically dry | 175,000 af or less      |

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The type of water year will be determined each year in the annual meeting referred to above using information based primarily upon basin runoff forecasts. The definitions for the type of water year could be changed in the future, upon agreement of the DWR, BLM, and FWS, especially if significant upstream depletions occur.

The following releases from the project facilities are needed for Colorado squawfish and have been agreed to by the State of Utah. These releases will be the basis for the operation criteria discussed above. Further information may permit changes in releases and such changes must be agreed to by the FWS.

- 1) Normal or Wet water year - Minimum of 250 cfs average monthly stream release from August 1 to June 14. From June 15 through July (critical spawning period), a range of 700 cfs to 300 cfs on a mean monthly basis. Daily release fluctuations shall not be greater than 100 cfs.
  - 2) Dry water years - Minimum of 250 cfs average monthly stream release from August 1 to June 14. From June 15 through July, an average monthly release of 375 cfs with a minimum daily release not less than 250 cfs. Daily release fluctuations shall not be greater than 100 cfs. It is recognized that natural flows may be below a minimum daily release of 250 cfs, in which case the amount of release will equal or exceed the natural inflow to the reservoir. When the inflow to the reservoir falls below the 250 cfs minimum, the DWR will provide up to 5,000 af from inactive storage to augment the low stream flow as directed by the FWS.
  - 3) Critically dry water years - It is recognized that natural inflows during a critically dry water year will be below a minimum daily release of 250 cfs during certain periods, in which case the amount of release will be jointly determined in the annual meetings between the State of Utah and FWS. Releases during critically dry water years will at least equal or exceed the natural inflow to the reservoir. The DWR will provide up to 5,000 af from inactive storage to augment the low stream flow during critically dry water years as directed by the FWS.
2. Monitor the suspected spawning site on the White River which is located approximately 15 miles below the dam.
    - a. A plan will be jointly developed by BLM, the State of Utah, and FWS, subject to FWS's approval, for the State of Utah to carry out and implement the following measures:
      - 1) Determine if this area is being utilized by squawfish for spawning.

## APPENDIX 4 (continued)

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- 2) Compare this site with the spawning site on the lower Yampa River in order to provide habitat enhancement, if FWS determines that it is advisable for the State of Utah to implement such enhancement measures.
- 3) Carry out a contingency procedure if supplemental stocking is deemed advisable by FWS. Should include planting Colorado squawfish eggs or imprinting fingerlings at this spawning site for the purpose of supplementing or establishing a spawning population that will home to this area.
- 4) Verify the recommended flow and temperature releases made in this opinion to determine the effect on the potential spawning area and modify releases as FWS determines advisable.
- b. Since there will be at least one field season (1982) prior to construction of the dam, another year of information shall be gathered to supplement the information collected in 1981 on the White River. A study will be developed jointly by the State of Utah, BLM, and FWS and be carried out by the State of Utah during the summer and fall of 1982 to gather more information on the suspected spawning site, migration data, and squawfish population below the proposed dam site.
3. Monitor the squawfish habitat above the dam.
  - a. A plan will be jointly developed by BLM, the State of Utah, and FWS subject to FWS's approval, for the State of Utah to carry out and implement some or all of the following measures:
    - 1) Recover squawfish in this area and move them downstream to the suspected spawning site or move them to a hatchery for broodstock.
    - 2) Monitor the stability of the squawfish population and obtain an estimate of the total number of squawfish above the dam.
    - 3) Attempt to establish a Colorado squawfish population in the reservoir and upstream.
  - b. A study will be developed jointly by the State of Utah, BLM, and FWS, subject to FWS's approval, and be carried out during the summer and fall of 1982 to gather more information on the squawfish population above the proposed dam site.
4. Determine the feasibility of squawfish passage around or through the dam. These conservation measures relating to the upstream population do not guarantee that there will be a self-sustaining subpopulation in the area above the dam. However, in our opinion the potential loss of that subpopulation will not result in the likelihood of jeopardy of the species.

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- a. This will require investigation of several techniques such as fish passage ways, trucking, etc. (This would correlate with number 3a.1. above)
- b. If determined feasible by FWS, a plan will be implemented to move squawfish around or through the dam.
5. Carry out habitat enhancement work for the adult Colorado squawfish above and below the reservoir if determined feasible by FWS, based upon monitoring work.
6. Participate in carrying out actions and measures to be identified in the forthcoming conservation plan for the endangered Colorado River fishes. This likely will include but not be limited to supporting the development of an endangered species hatchery and contributing a share of the manpower, equipment, materials, or equivalent funding for hatchery planning, site selection, design, and fish stocking. The extent of participation will be based upon percent of impact this project has on the entire population of Colorado squawfish equitably measured, based upon stream flow depletion and/or percent of habitat impacted.
7. Development of a reservoir fishery in the White River reservoir using native species only.
  - a. Study the feasibility of developing a fishery for the Colorado squawfish. The Colorado squawfish was an important food resource in the past, and the sportfishing potential of this fish should be fully explored. Reports indicate that it may reach 80 pounds, readily hit artificial lures, and that it is good eating. In fact, a fishery existed for the Colorado squawfish on the lower Colorado River until 1910 and even later in the Salt River basin, Arizona (revised draft recovery plan for the Colorado squawfish).
  - b. If determined feasible by the FWS, the State of Utah will establish a Colorado squawfish sport fishery in the reservoir. This would require that the Colorado squawfish be downlisted to a threatened status in the White River reservoir only.

### POTENTIAL LISTING OF NEW PLANT SPECIES

The BLM Vernal District has discovered a plant population in the genus Penstemon on the site of the proposed reservoir which may be a previously undescribed species. Two smaller populations have been found outside the reservoir site. A scientific manuscript has been submitted for publication and describes this plant as a new species and is under review by the scientific community. Until it is decided by taxonomists whether this plant is a valid species, we will refer to it as Penstemon.

## APPENDIX 4 (continued)

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sp. or White River penstemon. This Penstemon is presently a candidate species for listing as a Federally endangered species. The BLM is searching for Penstemon sp. in other likely habitats outside the proposed reservoir site. It appears restricted to the Evacuation Creek member of the Green River formation, thus, its distribution probably is quite limited.

It is possible that the WRDP could destroy a significant segment of the known White River penstemon population. However, it is likely that this plant can be transplanted to suitable habitat similar to the habitat to be lost to the WRDP. A memorandum of understanding (MOU) is being developed between FWS and BLM to carry out transplant work. It is intended that this MOU will be signed before right-of-way permits can be issued. It is our opinion that with a properly implemented MOU, the continued survival of the White River penstemon will be insured. The implementation of this MOU would also avoid the need to have an emergency listing for this species as a result of the WRDP and the unexpected development of later problems.

We appreciate your strong interest in conserving endangered species.



ROBERT H. SHIELDS



### PHILLIPS PETROLEUM COMPANY

ENGLEWOOD, COLORADO 80111  
7000 E. BELLEVUE, BOX 3259 PHONE 303 743-7147

MINERALS GROUP  
Oil Shale Division

March 12, 1982

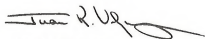
Mr. Lloyd Ferguson  
U.S. Department of Interior  
Bureau of Land Management, Vernal District Office  
170 South 500 East  
Vernal, Utah 84078

Dear Mr. Ferguson:

We are in receipt of the biological opinion issued recently for the White River Dam in Utah. As you are no doubt aware Phillips Petroleum Company is a one-third owner of the White River Shale Project currently under development in the Uintah Basin. As such, the White River Dam Project is of vital interest to us in that it constitutes the major source of water supply to the project. We are very happy to see that the environmental review process is moving forward and commend BLM and the U.S. Fish and Wildlife Service for the work accomplished to date in this regard.

The finalization of this biological opinion is an important step in the ultimate approval of the project. Phillips will defer the generation of specific technical comments to the White River Shale Oil Corporation and its consultants. We would, however, like to reiterate our support of the White River Dam Project and all efforts which lead to its approval.

We look forward to publication of the final Environmental Impact Statement and remain respectfully yours.



Juan R. Velasquez  
Environmental Coordinator  
Oil Shale Division

JRV/ljd  
File: WRSP L3-73(2)

## APPENDIX 4 (continued)



### DEFENDERS OF THE OUTDOOR HERITAGE

Jack Bratcher  
Post Office Box 7144  
Salt Lake City, Utah 84111  
Phone (801) 484-5241

March 5, 1982

Lloyd Ferguson  
Vernal District Manager  
Vernal District Office  
U. S. Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Dear Lloyd,

The Defenders of the Outdoor Heritage disavowed the Biological Opinion by the U. S. Fish and Wildlife Service on the White River Dam Project. The only incomplete things we found wrong in our minds is that they did not list the references. However, anyone can look them over at the U.S. Fish and Wildlife Service Salt Lake City Area office. So, it is not a big item with us.

We are looking forward to the final environmental impact statement.

We appreciate the courtesy of looking over the Biological Opinion and look forward in working together in our common goals with the BLM.

Thanking you for all considerations and courtesies extended to us.

Sincerely,

*Jack Bratcher*  
Jack Bratcher,  
Executive Director

United States  
Department of  
Agriculture

Forest  
Service

Rocky Mountain  
Region

11177 W. 8th Avenue  
P. O. Box 25127  
Lakewood, CO 80225

2670

March 18, 1982

Lloyd Ferguson, District Manager  
Bureau of Land Management  
170 South 500 East  
Vernal, UT 84078

Dear Mr. Ferguson:

The following comments on the Biological Opinion for the White River Project are submitted for your consideration:

1. Page 11 (Recommendations for Bald Eagles) - Periodic flooding of the riparian zone is necessary to maintain cottonwood. The dam precludes such flooding; how can cottonwoods be maintained below the dam under such conditions?
2. Page 14 (3.a.3) and Page 15 (7.b) - Will it be feasible to manage the reservoir fishery for squawfish within the overall reservoir fish management plan? If not, will squawfish management have priority over game fish? The position of the State wildlife agency regarding this matter should be incorporated into this recommendation.

Thank you for the opportunity to review this document.

Sincerely,

*W. B. Gallaher*  
W. B. GALLAHER  
Director, Range and Wildlife Management

# APPENDIX 4 (continued)



## United States Department of the Interior FISH AND WILDLIFE SERVICE

MAILING ADDRESS  
Post Office Box 22488  
Denver, Federal Center  
Denver, Colorado 80222

STREET LOCATION  
124 Union Blvd.  
Lakewood, Colorado 80226

IN REPLY REFER TO  
FA/SE/BLM-White  
River Dam

APR 15 1982

### MEMORANDUM

To: State Director, Utah State Office,  
Bureau of Land Management, Salt Lake City, Utah

From: Regional Director, Region 6 (SE)

Subject: Errata Sheet for the White River Dam Biological Opinion

Attached is an errata sheet for the White River Dam biological opinion issued February 24, 1982. Changes in project design as well as errors and omissions have made it necessary to issue this errata sheet. These changes do not change the basic content of the biological opinion.

*Charles E. Smith*

Attachment

## Errata Sheet For White River Dam Biological Opinion Issued On 24 February 1982

### Page 2, paragraph 1

The final project design numbers have changed slightly. In the first line, change 13.5 to 11.7. (The reservoir will inundate 13.5 river miles). In the seventh and eighth line, change to 136 feet high and 2,400 feet long. In the ninth line, change 29 million kilowatt hours to 31.4 million kilowatt hours.

### Page 2, paragraph 2

Delete thermal power from line two because thermal power is no longer a proposed use of the project water.

### Page 3, paragraph 2

Delete last sentence beginning with - Mean monthly ...

### Page 3, table

Using information for the Utah-Colorado simulation model (which has been updated to include operation criteria for normal and wet, dry, and critically dry years) the percent flow reduction of the White River should be changed to:

	Green river Confluence		Below Dam to Mtn. Fuel Bridge*	
	Mean Monthly <sup>1</sup> flow (cfs)	% flow <sup>2</sup> reduction	Mean Monthly <sup>1</sup> flow (cfs)	% flow <sup>2</sup> reduction
June	1684	6.6	1687	6.7
July	610	6.9	606	6.9
August	326	26.0	310	25.1
September	293	27.5	288	27.1

<sup>1</sup> Based on flow with project 1931-1980 data.

<sup>2</sup> These figures are based upon releases from the dam between 250 and 2000 cfs.

\* Mountain fuel bridge - In the White River 21.3 miles from the confluence of the Green River.

### Page 3, last sentence

The 66 cfs should be changed to 772 cfs.

## APPENDIX 4 (continued)

### Page 4

The first table should be changed to:

	Mean Monthly <sup>1</sup> flow (cfs)	% flow <sup>2</sup> reduction
June	14,666	0.8
July	6,136	6.8
August	3,466	2.9
September	2,979	3.1

<sup>1</sup>Based upon period from 1963-1980.

<sup>2</sup>Based upon the release from the dam being between 250 and 2000 cfs.

### Page 6, last paragraph

On line five, change 136 mi. to 150 mi. On line nine change 80 mi. to 100 mi.

### Page 7, paragraph 2

On line fourteen change 136 mi. to 150 mi.

### Page 7, paragraph 3

The sentence on line four and five should be changed to read, "Only 15 of these 51 squawfish (29%) were collected."

Also, the next sentence (line six and seven) should be changed to read, "The upper range of distribution appears to be 150 mi. up the White River."

### Page 12, last paragraph

Operation criteria should be changed to read:

<u>Operation Criteria</u>	<u>April-September</u>	<u>Annual</u>
1) Normal or wet	Greater than 235,000 af	Greater than 380,000 af
2) Dry	235,000 to 175,000 af	380,000 to 315,000 af
3) Critically dry	175,000 af or less	315,000 af or less

### Page 13, paragraph 2 under number 1

The second sentence should be changed to read, "From June 15 through July (critical spawning period), a range of 700 cfs to 300 cfs, with an average of 500 cfs, on a mean monthly basis."

APPENDIX 4 (continued)

WHITE RIVER SHALE OIL CORPORATION

SUITE 500 PRUDENTIAL BUILDING, 115 SOUTH MAIN STREET  
SALT LAKE CITY, UTAH 84111  
(801) 365-1170

April 14, 1982

Mr. Lloyd H. Ferguson  
District Manager  
Bureau of Land Management  
170 South 500 East  
Vernal, UT 84078

Dear Mr. Ferguson:

On February 24, 1982, the U. S. Fish and Wildlife Service issued a final biological opinion relative to the Utah White River Dam Project (WRDP). The opinion concluded that with the implementation of conservation measures designed to aid the survival and recovery of the Colorado squawfish the WRDP would not jeopardize the continued existence of any listed endangered species. In response to your public notice of March 2, 1982, following are the White River Shale Oil Corporation's (WRSOC) comments on the biological opinion.

1. WRSOC supports the conclusion of the USFWS that the WRDP will not adversely affect endangered species and, in particular, the Colorado squawfish. This is an important step toward the eventual construction and operation of this very important and worthwhile project. However, because the USFWS report on the White River referred to in the opinion has not been made available, we cannot comment on the validity of the various conservation measures.
2. As you are aware, WRSOC (as operator for the leases of Federal Prototype Oil Shale Tracts Ua and Ub) funded an aquatic biology study on the White River during 1981. The study was conducted by Ecosystem Research Institute (ERI) of Logan, Utah, and was intended to supplement information being collected by the USFWS and BLM on the White River (and also the Yampa River). The ERI studies were well coordinated with those of the USFWS and BLM. The information from the ERI studies was provided to USFWS prior to publication of the final biological opinion.

Mr. Lloyd H. Ferguson  
April 14, 1982  
Page 2

At WRSOC's request and based upon the available information collected in the White River, ERI has prepared an "Impact Assessment of the White River Dam" which is enclosed with this letter. Unfortunately, since the USFWS report on its White River study has not been made available to the public for review, the attached ERI report does not, and cannot, address the USFWS opinion specifically. It does discuss the dynamics of the total river system and how they will be affected by the reservoir.

3. We question the USFWS statement that issuance of the right-of-way for the dam should be conditioned upon the signing of a memorandum of understanding concerning the White River penstemon. This plant species has not been listed as threatened or endangered and the actual distribution and nature of this species have not been well identified. Further study of the species appears reasonable, however, conditioning approval of the right-of-way based on the species does not appear to be justified.

We will appreciate your consideration of these comments and look forward to EIS approval and construction of the Utah White River Dam. Please contact me if you have any questions on this matter.

Sincerely,

*James W. Godlove*

James W. Godlove  
Director of Environmental Affairs

JWG/FB

Enclosure

## APPENDIX 4 (continued)

### STATE OF COLORADO DEPARTMENT OF NATURAL RESOURCES

1315 Sherman St., Room 318, Denver, Colorado 80202 302-3311



Board of Land Commissioners  
Division of Administration  
Division of Mines  
Division of Parks & Outdoor Recreation  
Division of Water Resources  
Division of Wildlife  
Division of Energy  
Oil and Gas Conservation Division  
Soil Conservation Board  
Water Conservation Board  
Wild Land Recreation

April 19, 1982

Mr. Carl Thurgood  
U.S. Bureau of Land Management  
P.O. Box 768  
Richfield, UT 84701

Dear Mr. Thurgood:

This letter concerns the biological opinion on the White River Dam project, Utah. The opinion is set forth in a February 24, 1982, memorandum to the State Director, Utah State Office, Bureau of Land Management (BLM), from the Acting Regional Director, Region 6, Fish and Wildlife Service. The biological opinion was prepared by the Fish and Wildlife Service in response to a request for consultation by your agency concerning the issuance of a right-of-way for the White River Dam project.

Neither this biological opinion nor the conditioning of BLM permits based upon this opinion is of direct concern to the State of Colorado. However, the State wishes to make known its fundamental disagreement with the basis for the opinion. The State does not waive its right to seek future judicial review of any federal agency action if the State, its agencies, or its political subdivisions ever suffer any legal wrong because of any federal agency action based upon this biological opinion or ever are adversely affected or aggrieved by any such federal action.

We respectfully request that the final EIS and all other documents and permits associated with this project contain the following disclaimer:

Mr. Carl Thurgood  
April 19, 1982  
Page two

This report is not to be construed as reflecting the present or future position of any state of the Upper or Lower Colorado River Basin or the Federal Government with regard to interpretation and application of the treaties, compacts, and laws which do or may affect the allocation of water among the states and among private claimants within each state. In particular, nothing in this report is intended to interpret the provisions of the Colorado River Compact (45 Stat. 1057), the Upper Colorado River Basin Compact (63 Stat. 31), the Water Treaty of 1944 with the United Mexican States (Treaty Series 994, 59 Stat. 1219), the decree entered by the Supreme Court of the United States in *Arizona v. California* (376 U.S. 340), the Boulder Canyon Project Adjustment Act (54 Stat. 774; 43 U.S.C. 618a), the Colorado River Storage Project Act (70 Stat. 1095; 43 U.S.C. 620), or the Colorado River Basin Project Act (82 Stat. 885; 43 U.S.C. 1501), or to interpret or reach any conclusions regarding future application of the Federal reserved rights doctrine. Furthermore, nothing in this report shall be taken to represent the present or future position of either the State of Colorado or the State of Utah, or the United States, with regard to any matter concerning the apportionment of the waters of the White River.

Thank you for the opportunity to review this matter.

Sincerely,

*Monte Pascoe*  
B. Monte Pascoe  
Executive Director

DMR/g1

cc: Vernal District Office  
U.S. Bureau of Land Management  
Utah State Office  
U.S. Bureau of Land Management  
Don Minnich, Regional Director  
D.F. Fish and Wildlife Service  
Dan Lawrence, Director  
Utah Division of Water Resources

## APPENDIX 4 (continued)



5 April 1982  
721 Second Avenue  
Salt Lake City, Utah 84103

Mr Lloyd Ferguson  
Vernal District Office  
Bureau of Land Management  
170 South 500 East  
Vernal, Utah 84078

Dear Mr Ferguson:

Many members in Utah Nature Study Society are deeply concerned about the White River Project. Upon reading the Biological Opinion by the United States Fish and Wildlife Service, we were initially impressed with the measures that were 'suggested' to mitigate and conserve the habitat for the endangered species. However, suggestions are not sufficient when a project will permanently alter the course of the river. This is especially true when there was no effort suggested in the mitigation plan to coordinate stream use in Colorado. Utah Nature Study Society feels that a full basin wide Environmental Impact Statement is needed for the White River and a complete plan of water use and water flows with full coordination between Colorado and Utah and the Federal government. Otherwise the conservation plan for the Colorado Squawfish does not have much meaning.

Some of us in Utah Nature Study Society have been involved with life history studies of plants and animals. It takes up to five years for a life history study to be completed. It may take ten years. Then when the data is published, someone else in some other part of the range may start making some observation and in another five years note that the initial interpretations needed revising. Usually before a life history is 'known' for a species it involves three or more studies by independent observers in different parts of the range. The Colorado Squawfish has had only three years of study completed by a coordination of Federal, State and Private biologists. After this data is complete and published, it is necessary to re-evaluate the data by a different set of biologist for future studies. It is also necessary to examine related fish as the Sacramento (P. gonis), the Unquap squawfish (P. umquae) and the Northern Squawfish (P. oregonensis). This allows for the determination of genetic similarities and species differences- factors very important in life history of any species.

Thus, based on the above lines of reasoning, Utah Nature Study Society recommends that the Bureau of Land Management not grant any right-of-way permits until a basin wide EIS study is complete and more information is accumulated on the genus of squawfish.

Sincerely,  
*Peter Hovig*  
Peter Hovig  
President

-3-

5) There is mention that the Division of Water Resources will provide up to 5000 acre-feet from inactive storage during dry and critically dry water years. It should be noted that after 38 years, the inactive reservoir will be silted in. Are the conservation measures going to last beyond 38 years or are these measures just temporary so that the project can get started? It seems that for the conservation measures to work, the fish need water rights that are equivalent to the states water rights and the industries water rights and the agricultural water rights. What is the State record on conservation pools during drought? It seems that the Division of Wildlife Resources pays dearly for the conservation pools. Do these conservation pools be utilized for agriculture and industry during drought? Is the Division of Wildlife Resources reimbursed for these draw-downs on the conservation pools? During normal years the conservation pools are not needed.

6) "Development of a reservoir fishery in the White River reservoir using native species only" has certain implications. First, since this is unknown in Utah to use native fishes for fishery, a new set of procedures has to be implemented and a new set of attitudes. Second, the Draft EIS implied that trout and/or bass might be introduced either below the dam or in the reservoir. Native fisheries would prevent such introductions of exotic fishes in the reservoir. Would it also prevent introduction of exotic fishes in Taylor Draw reservoir? Without bass or trout, recreational potential on the reservoir would be essential nil. What will the affect of siltation have on the native fishery proposal on the reservoir?

6) "...for the State of Utah to carry out and implement some or all of the following measures....", "determine the feasibility of squawfish passage around or through the dam", "...if determined feasible....", "participate in carrying out actions and measures to be identified in the forth coming conservation plan", "Development of a reservoir fishery in the White River reservoir using native species only... Study the feasibility...., if determined feasible..." There seems to be much uncertainty in many of the conservation measures. Yet after a hundred years the reservoir will be silted in to beyond any conservation measure. Perhaps the biological opinion and the Environmental Impact Statement should deal with the management of the reservoir when it is silted in. This may happen faster than the development of a squawfish passage.

The Biological Opinion is very informative and based on several years of very intensive fieldwork. The biologist are to be complemented for their good work under extreme pressures to learn about these unusual native fishes of the Colorado River drainage. However, in view of the uncertainties of the Project and Dam itself and in view that there is much time still to develop an entire river management plan based on very little oil shale development and a crop program for oil shale development, we strongly recommend that the Bureau of Land Management do a complete Environmental Impact Statement on the Entire White River, both in Utah and in Colorado.

Sincerely,  
*Peter Hovig*  
Peter Hovig  
Board of Trustees  
Intermountain Water Alliance

# APPENDIX 4:tter

Dear Lloyd,

I'm writing to you about the White River Dam Project proposed SE of Bonanza. I have a copy of the Biological Opinion and have completed reading it. I found a good bit of information in it. I think the White River panstemon's, bald eagles, hawks, and squawfish have been here a long time and have survived just fine.

But now the DOWR wants to change everything free, decent, and wild about the river. They want another stinking silt trap with power lines, pumping stations, oil shale mines, retool plants, darkening skies, and everything in sight slowly dying.

I don't believe for one second that DOWR, the State of Utah, or oil shale developers are the least bit concerned about squawfish or panstemon. Just look at "Lake" Powell and Flaming Gorge Reservoir. And now the evil swine want to make the White river our next national sacrifice area. I don't want dams and oil shale strip mines. I want cheap and clean solar energy along with plenty of clean air and clean water. I'm tired of watching Rape of the West, it's time to stop this destruction.

Tell them to get out and stay out.

Tell them the squawfish and eagles were here first and need this river (unspoiled) more than they do. Tell them to go develop solar energy.

I definitely think it's also time for some designated wilderness areas south of Bonanza. And can't you keep these oil companies out of the area? I've worked for them before and have seen the waste, pollution, and destruction of public lands.

I hope you can stop this dam Lloyd, I really love the White River and all the creatures that call it home.

Sincerely, David A. Rose

463 32 $\frac{1}{2}$ rd, #4  
Clifton, Co.  
81520

## APPENDIX 4 (continued)

1371 East 1700 South  
Salt Lake City, Utah 84105  
April 12, 1982

Lloyd Ferguson  
BLM District Manager  
Vernal District Office  
170 South 500 East  
Vernal, Utah 84078

Dear Mr. Ferguson,

I have reviewed the White River Dam Biological Opinion prepared by the U.S. Fish and Wildlife Service and offer the following comments:

- 1) It is difficult to see how the conclusion on page 6, that squawfish will not be adversely affected by the projected increased salinity, was drawn from the rationale on page 5, that the increase in salinity at Imperial Dam (California) would be only 3.4 mg/l. It seems irrelevant that the salinity concentrations hundreds of miles downstream of known squawfish habitat (squawfish are not found in the lower Colorado River below Lake Powell ) would be within acceptable limits. In order to assess the effect of increased salinity on squawfish, one would have to know the incremental and total salinity where the squawfish live - in the White and Colorado Rivers in Utah and Colorado. This was not given in the Biological Opinion.
- 2) The conclusion on page 5 that the, "average annual reduction in silt load of the Green River . . . will probably have a beneficial effect on the spawning area," is not consistent with the biological requirements, described on page 7; "Colorado squawfish evolved in and apparently require habitat conditions typified by great seasonal fluctuations in flow, high turbidity and silt load, and warm summer temperatures." (emphasis added). The biological requirements of the Colorado squawfish suggest that decreased silt load and turbidity downstream of the dam would adversely affect the squawfish. More study on the effect of decreased silt load and turbidity is needed, particularly since one of two known spawning areas may be affected (page 8).
- 3) Page eight states that without Conservation Measures, the White River Dam would alter habitat characteristics (which include turbidity and silt load) believed essential for the continued existence of the Colorado squawfish. Yet, Conservation Measures listed on pp. 12-15 do not provide for certain downstream turbidity and silt load parameters. It is therefore difficult to see how these Conservation Measures adequately mitigate adverse impacts to habitat characteristics and insure the continued existence of the Colorado squawfish.
- 4) Conservation Measure 7 does not seem realistic because:
  - the reservoir environment does not appear to meet most of the squawfish's habitat requirements (in fact, their decline correlates with reservoir construction (page 7)); and
  - even if the State of Utah did not stock traditional game fish, it is likely that sport fishermen would stock them on their own. These game fish would likely out-compete the squawfish because they are more suited to a reservoir habitat.
- 5) Who will enforce the Conservation Measures listed on pp. 12 - 15? Has the cost of this mitigation (some of which appear rather costly) been figured into the benefit-cost ratio of the project?

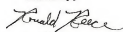
WRD Biological Opinion - page 2

- 6) The cumulative effect of the White River Dam and other proposed upstream projects on Colorado squawfish, humpback chub and bonytail chub has not been addressed.

The majority of Conservation Measures (numbers 2 through 7) recommend further study. They seem to indicate that much still remains unknown about squawfish habitat downstream from the proposed White River Dam and how it would be affected. It appears that the further study prescribed in Conservation Measures 2 through 7 is needed before a non-jeopardy opinion is made.

Thank you for the opportunity to review this Biological Opinion. Please include my comments in the final EIS.

Sincerely,



Ronald Reece

APPENDIX 4 (continued)

RICHARD D. LAMM  
Governor



J. A. DANIELSON  
State Engineer

DIVISION OF WATER RESOURCES

Department of Natural Resources  
1313 Sherman Street - Room #18  
Denver, Colorado 80203  
Administration (303) 439-3581  
Ground Water (303) 693-3947

April 15, 1982

Lloyd Ferguson  
Bureau of Land Management  
Vernal District Office  
170 South 500 East  
Vernal, Utah 84078

Re: White River Dam Biological Opinion

Dear Mr. Ferguson:

We have no specific comments or objections on the Biological Opinion. We do value the Bureau of Land Management and others efforts to protect endangered wildlife.

We would like to be added to the list of agencies, organizations, and persons to whom copies of the Final Environmental Impact Statement are sent.

Sincerely,

Hal D. Simpson, P.E.  
Assistant State Engineer

HDS/JRH:spkr

1049 Knox Ct.  
Denver, Colorado 80204  
303-534-2732

Lloyd Ferguson  
BLM Vernal District Manager  
Vernal District Office  
170 South 500 East  
Vernal, Utah 84078

Dear Mr. Ferguson:

The biological opinion on the White River Dam Project is critically deficient with regards to the Colorado Squawfish (*Ptychocheilus lucius*). Discussion of impacts on this fish due to decreased sediment load of the river was conveniently absent. The importance of these silt laden waters to the squawfish is made manifest by careful observation of its spawning habits. Squawfish spawn in shallow sediment laden waters and the egg mass adheres to the bottom. At Willow Beach National Hatchery, brooding squawfish spawned naturally in gravel beds in 30 cm of water as water temperatures reached 22°C according to one researcher. While the eggs appeared adhesive, stirring of the gravel readily dislodged the eggs.

This appears to be exactly what will happen if this dam is constructed as proposed. This dam will likely scour the river much beyond the suspected spawning site below the dam. While squawfish may be induced to spawn naturally, (due to increased temperatures) they may do so in unsuitable habitats (i.e., gravel vs silty bottom) resulting in little or no egg survival. The net result will be a cessation of squawfish reproduction and ultimately extinction within the White River. In light of this, the Fish & Wildlife Service determination of no jeopardy is completely indefensible.

In closing, I urge you to reconsider this determination of no jeopardy. Destruction of this very finite amount of squawfish habitat does not justify construction of a dam being built on speculation, especially when many other alternatives exist. Thank you for this opportunity to express my concerns. Please reconsider.

Sincerely,

Stephen E. Drabik

## APPENDIX 4 (continued)

STATE OF COLORADO  
Richard D. Lamm, Governor  
DEPARTMENT OF NATURAL RESOURCES  
**DIVISION OF WILDLIFE**  
Jack R. Grieb, Director  
6050 Broadway  
Denver, Colorado 80216 (825-1192)



April 12, 1982

Mr. Lloyd H. Ferguson  
District Manager  
U. S. Dept. of the Interior  
Bureau of Land Management  
170 South 500 East  
Vernal, UT 84078

Dear Mr. Ferguson:

Appended please find Colorado Division of Wildlife's comments on the Biological Opinion issued by U. S. Fish and Wildlife Service on the (Utah) White River Dam. We are responding to the FWS news release of February 26th soliciting public input. We would like to participate early in the development of the M.O.U., as Colorado will likely be directly and indirectly affected by this and future development of the White River. We trust that our comments will be received early enough to be included with the printed Environmental Impact Statement.

The appended pages contain specific comments related to the cited pages of the Biological Opinion. Please keep us updated on your progress.

Sincerely,

*Jack R. Grieb*  
Jack R. Grieb  
Director

JRG/JRB/ag

Enc.

cc: R. Jacobsen, USFWS/Salt Lake  
(with enclosures)

DEPARTMENT OF NATURAL RESOURCES: Monte Pascoe, Executive Director • WILDLIFE COMMISSION: Donald Fernandez, Chairman  
James Smith, Vice Chairman • Richard Dreibliss, Secretary • Jean K. Todd, Member • James C. Kennedy, Member  
Michael Higbee, Member • Sam Gault, Member • Wilbur Hadden, Member

### SPECIFIC COMMENTS RELATED TO U. S. FISH AND WILDLIFE SERVICE BIOLOGICAL OPINION ON UTAH WHITE RIVER DAM

Page 2, Para. 3: Flows during dry or most years should be addressed, even if only "worst case" estimates. The minimum release flow of 50 cfs would be "... dangerously low flow for Colorado squawfish (Prewitt and Carlson; BLM Biol. Series Publ. No. 2, pg. 39); this is prime squawfish habitat (Behuke and Benson, 1980--Bull. 503-A, Coop. Ext. Service, CSU).

Page 2, Para. 4: Cumulative impacts from proposed Taylor Draw (Colorado White River) Project should be addressed here and elsewhere.

Page 3, Monthly Flows Chart: Considering the reduction in flows of 13% to 40% during spawning and nursery season, what will be projected effects downstream in the Green River? In the White?

Page 4, Table 1: Downstream water temperatures will be affected by the volume of water released; this opinion should definitely establish maximum and minimum seasonal water temperatures ... make the statement that the dam will be operated so that ...

Page 5, Para. 1: "... reduction in silt load ..." is likely to be a disadvantage to endemic fishes that evolved in this turbid ecosystem. "... beneficial effects on the suspected spawning area ..." are not to be taken for granted, they depend heavily on the timing of actual water release. "Construction of the dam would modify ..." ("--favorably?") ... over a period of years." How many years? Then what?

Page 5, Para. 2: "... would increase ..." to what level? Why the citation of lab tests? Was it done using White River water, similar salts and solids? This paragraph (continued onto Page 6) is confusing. Give actual, projected values and compare literature.

Page 6, Para. 2: "... in sediment build up in certain areas, ..." Essential habitats? Estimate of loss? "... add further to the chemical and physical changes ..." Care to explain or extrapolate? What impact on scouring of spawning areas gravel would smoothing out runoff peaks cause?

Page 6, Para. 3: "Other participants ... Colorado Division of Wildlife" since 1977.

Page 6, Para. 5: "... of this species is declining." Please qualify the word declining; references (?). "... above the proposed dam site ..." in Colorado? Certainly into Colorado. Given the potential (probable?) significance of this 10% of the squawfish habitat, we should not be so quick to down play its importance.

## APPENDIX 4 (continued)

- 2 -

Page 7, Para. 1: "... will be adversely affected . . . the dam may (will) block seasonal . . ."

Page 7, Para. 2: "... one adult squawfish about 122 miles up the White River in 1980 (Wick et al., 1981--Se-3-3 Report). . . " 136 miles up the White River in 1981 (Colo. Div. Wildl. Job Progress Report, SE-5-1 or T. Lytle et al., in press).

Page 7, Para. 3, line 6: "... to be 134 miles up . . ." reported as 136 miles previously. "In the only intensive systematic study . . ." in Utah? BOW has systematically sampled the White River. "Only 17 of these . . . (332) Y-O-Y . . ." Not too surprising if this area was only superficially sampled. "Movement and spawning migrations have been documented . . ." as far upstream as Rangely—a trip that this dam may prevent/block.

Page 8, Para. 2: "... downstream (passive) drift . . ." This movement . . . implies locomotion, or something other than passive drift. Why not include CROW larval data here?

Page 8, Para. 3: Would R. Hamman's work in the hatchery be useful here?

Page 8, Para. 5: "... in the upper Colorado River basin . . ." Spawning also occurs in the Colorado River near Loma, and near Black Rocks. "... conducive to egg survival . . ." Does this implicate exotic fish predation?

Page 8, Para. 6: "This project would reduce . . ." and block upstream and downstream movement of squawfish . . .

Page 9, Para. 1: Good concept of using native fishes to establish reservoir fishery.

Page 9, Para. 1: Any change toward lotic environment would also favor predation of exotics on eggs, larvae, young of endemic species. Adults may not be too adversely affected, but as in Lake Powell, probably will not spawn.

Page 9, Para. 2: Flows, not carefully planned, could induce premature spawning, and larvae could be washed out by heavy flows.

Page 9, Para. 3: The importance of tributaries cannot be over-stated. "... without changes . . ." Will changes preclude jeopardy opinion?

Page 10, Para. 2: Three active bald eagle nests have been located on the White River during the last three years.

Page 10, Para. 4: "... not expect the soils . . . to support cottonwood trees." Yet on Page 11, Paragraph 6, lines 6-7, you suggest planting trees!

- 3 -

Page 11, first line: "... of a cumulative loss of eagle habitat . . ." Are you addressing Taylor Draw here? Perhaps, as with fishery discussion, you should.

Page 11, Para. 3: Does the area have any historic nest sites?

General comment: Suitable nesting habitat for bald eagles will be inundated or otherwise removed from availability. Because the number of nesting bald eagles in northwest Colorado is increasing and young are being fledged, we believe that these birds will return there to nest when they have matured.

Page 12, No. 1a: "Between June 15 and July 31, . . ." Longer period is needed to insure proper incubation period.

Page 14, No. 3a-b: This will take some discussion. What about the Colorado White River that will be impacted by this dam?

Page 14, No. 4: "However, in our opinion the potential loss of that subpopulation . . . not result . . . jeopardy of the species." The potential loss means nothing, but we would all agree that the actual loss should not be condoned. If you could show some (sub-) population abundance estimates, we might agree. Taylor Draw's potential impact should be considered too.

Page 15, No. 4a: "... passage ways, trucking, etc. . . ." Etc.? Like what? We, too, would be greatly interested in method(s) that were tested, proven and reliable to allow "big-river" fish passage. We would like more than an opinion on feasibility.

Page 15, No. 6: The endangered species hatchery is a good idea. Where would it be housed; how funded; brood stock from where?

Page 15, No. 7: May not be too popular of an idea.

General Comment: We are sure that none of us want Colorado and Utah saddled with a structure impervious to the natural movements (up and downstream) of regional big-river fishes. We would also like an idea of the species contemplated for stocking into this potential reservoir; we favor native species.

It would have been helpful to have a list of literature cited.

## APPENDIX 4 (continued)



### INTERMOUNTAIN WATER ALLIANCE

227 Judge Building  
8 East Broadway  
Salt Lake City, UT 84111  
801-531-7530

March 29, 1982

Board of Trustees  
Dr. Fred Sorenson  
John Hovick  
Carl Osborn

Executive Director  
Barbara Meyer  
Consultants  
Stream and River  
Management  
Dr. Fred Reinherz  
Barbara - Fish  
Fishermen Groups

Water River  
Foster Hovick  
Western Whitewater  
Pumping  
Les Jones

Central Utah Project  
Bureau Survey

Water Policy and  
Administration  
Lillian Hovick  
Shel Brown  
Sara Nichol

Salt Lake County and  
City Water Supply  
Sara Nichol

Information Service  
Gordon  
Water and Science Rivers  
Wildlife Habitat  
Great Basin, Riparian,  
Wetlands

Mr. Lloyd Ferguson  
Bureau of Land Management, Vernal District Office  
170 South 500 East  
Vernal, Utah 84408

Dear Mr. Ferguson:

The biological opinion has provided new information that contradicts the original Draft Environmental Impact Statement and provides new information of the Project concerning the White River Dam, Reservoir, and Hydroelectric power.

1) Capacity of the hydroelectric unit was 5 to 6 megawatts in the draft and is now 15 megawatts in the biological opinion. This doubles the capacity of the hydroelectric unit at a time when Utah Power and Light postponed the construction of Hunter A because of the lack of customers. Likewise it is noted that many of the participants of the Intermountain Power Project will not be utilizing the capacity of the IPP because they are also members of the Moon Lake Project near Bonanza. At the same time the capacity was doubled, the annual output remained 29 million kilowatt-hours. This means that the hydroelectric capacity will be operating at 23 % of capacity. If peaking power is being planned, then the Environmental Impact Study should adjust the effects of peaking power on the stream below the dam. Such irregular surges of water could lower the channel and dry up the downstream riparian habitat.

2) The Draft Statement based water consumption on approximately 62,000 acre-feet per year. The biological opinion increased this to 75,000 acre-feet per year. What has changed to establish this new level?

3) For the first time use of water is shown in cubic feet per second (cfs). The biological opinion states that 104 cfs would be utilized. This compares with the low of 139.9 cfs in July 1977; the lowest year on record. Thus again the data has shown that there is no need for the White River Dam at this time. The average flow is greater than 350 cfs in non-peak seasons. Most of the time the Division of Water Resource together with that expected by the Utes (104 + 224 = 328 cfs) is less than the average flow. Conjunctive use of water (see "The State of Utah Water- 1978" by the Utah Division of Water Resources) could be implemented by utilizing

-2-

ground water from the Bird's Nest Aquifer and the Douglas Creek aquifer. The Environmental Impact Statement should address the cost of pumping water directly from the White River for six months and pumping ground water for six months at the site of use. This should be compared with the cost of purchasing water from the reservoir and pumping water from the reservoir.

At this time we propose that the energy developers pump water from the White River in November, December, January, February, May and June (the last two months during peak runoff) and pump water from the ground in March, April, July, August, September, and October. The value of this alternative is that river recreation and wildlife and downstream agriculture can utilize the water during the critical and peak times of the year while it is in the White River. This would also allow the State of Utah to practice conjunctive use of water.

We also have some comments on the mitigative measures for the endangered species. We note that at this time we have not yet seen any mitigation proposals for canoe-camping recreation or for the Fremont cottonwood riparian ecosystem that would be destroyed.

1) Recommendations for Bald Eagles: "We recommend planting cottonwood trees along the shoreline where soil and water conditions favor their development". Where will soil and water conditions allow for cottonwood trees? What reservoirs in Utah have trees growing along the edges? Will the cottonwood trees be native Fremont cottonwoods or an exotic cottonwood?

2) Conservation Measures for the Colorado Squawfish. "The State of Utah will provide funding and/or equivalent resources to insure that the following conservation measures are implemented". What will the sources of funding be? From hunting and fishing licenses? From non-game tax write-offs? From the present unreliable support of the general funds? What is the nature of equivalent resource? Does this mean that personnel will be pulled from existing programs? Funding for the Conservation Measures must come from revenues to the Utah Division of Water Resources before any disbursements occur or other endangered species programs in the state may suffer!

3) Stream flow releases are determined for the squawfish based on the initial amount of water proposed to be released from the dam. Canoe recreation requires at least 360 cfs and 400 would be optimum. How will these flow rates affect the squawfish?

4) "Critically dry": 175,000 acre-feet or less. When has this occurred? The Draft EIS states the lowest annual flow of record was 223,000 acre-feet in 1977. Thus dry (235,000 to 175,000 acre-feet) and critically dry are essentially non-existent. Do these conditions refer to human consumption in Colorado (as the Taylor Draw Project)? What distinguishes critically dry and dry from upstream consumption (there is still no comparison of the White River between Utah and Colorado)? It is important in the conservation measure for the Colorado Squawfish that the entire White River be studied, an environmental Impact Statement be made, and a water plan be made before any further projects are planned in the area (including the Taylor Draw and the White River Project).

\* A citizen's group dedicated to preserve and wise use of Utah's water resources in the broad public interest. Our aim is to involve citizens in water policy decision-making by providing information, by encouraging public participation by supporting legal reforms to clarify reciprocal public and ecological values, and by promoting environmentally and economically sound water management."

## APPENDIX 4 (concluded)

### UTAH WILDLIFE FEDERATION

Affiliated with the National Wildlife Federation

P.O. Box 15636  
Salt Lake City, Utah 84115



25 March 1982

Bureau of Land Management  
Vernal District Office  
ATTN: Mr. Lloyd Ferguson  
170 South 500 East  
Vernal, UT 84078

Dear Mr. Ferguson:

We reviewed the White River Dam Biological Opinion and concur with the opinion and its application as written.

We request assurance that the other wildlife which will be affected by the proposed dam are as properly mitigated as the species discussed in the opinion paper. We also encourage maximizing every opportunity to create a sports fishery in the proposed facility during its planning phase.

Thank you for the opportunity to comment.

Sincerely,

*Sheldon M. Eppich*  
for  
SHELDON M. EPPICH  
President  
Utah Wildlife Federation

SME:bjw

## APPENDIX 5

### APPENDIX 5

Energy Accounting for Construction of the  
White River Dam and Alternatives

Appendix 8 provides the results of the energy analysis for each alternative. The following items clarify use of the table:

1. In order to provide a common base for analysis, all dollar figures have been deflated to 1967 levels using the general deflators: 1978 = 196.4 and 1979 = 217.4.
2. All conversion factors are in Btu/dollars unless noted otherwise.
3. Primary conversion source is Bullard, et al. (1976), unless indicated otherwise. The first column is the national sector number from Bureau of Budget (1967) and the second column is the Bullard aggregated sector number. Evaluations of comparability between the two were made in numerous cases to ensure accuracy.

Component	Source	Conversion (Btu/\$)	1967 Dollars or Cubic Yards	Btu/Item
<u>ALTERNATIVE 1 - White River Dam</u>				
<u>General Conditions</u>				
Supervision	8911 344	28,103	3.66x10 <sup>4</sup>	1.03x10 <sup>9</sup>
Inspection	8911 344	28,103	3.05x10 <sup>4</sup>	8.58x10 <sup>8</sup>
Survey and Stake	8911 344	28,103	5.87x10 <sup>4</sup>	1.65x10 <sup>9</sup>
Timekeeper and Clerk	8911 344	28,103	1.59x10 <sup>4</sup>	4.46x10 <sup>8</sup>
Field Engineer	8911 344	28,103	3.3x10 <sup>4</sup>	9.27x10 <sup>8</sup>
Mobilization and Demobilization	342	30,807	3.05x10 <sup>4</sup>	9.41x10 <sup>8</sup>
Reports	344	28,103	1.27x10 <sup>4</sup>	3.58x10 <sup>8</sup>
Hand Tools	3423 207	70,911	1.78x10 <sup>3</sup>	1.26x10 <sup>8</sup>
Equipment Rental and Repair	253	69,072	1.22x10 <sup>4</sup>	8.44x10 <sup>8</sup>
Shop Drawings and Samples	8911 344	28,103	1.12x10 <sup>3</sup>	3.15x10 <sup>7</sup>
Offices	1511 23	59,340	3.67x10 <sup>3</sup>	2.18x10 <sup>8</sup>
Sheds	1511 23	59,340	6.11x10 <sup>3</sup>	3.63x10 <sup>8</sup>
Telephone and Telegraph	4811 327	22,085	3.67x10 <sup>3</sup>	8.1x10 <sup>7</sup>
Heating	5	11,077	9.78x10 <sup>2</sup>	1.08x10 <sup>7</sup>
Electric	4	38,951	1.1x10 <sup>3</sup>	4.28x10 <sup>7</sup>
Water	329	11,453	1.47x10 <sup>3</sup>	1.68x10 <sup>8</sup>
Sanitary Facilities	329	11,453	1.1x10 <sup>3</sup>	1.26x10 <sup>8</sup>
Access Road	26	125,758	4.58x10 <sup>4</sup>	5.76x10 <sup>9</sup>

# APPENDIX 5 (continued)

APPENDIX 5 (continued)

Component	Source	Conversion (Btu/\$)	1967 Dollars or Cubic Yards	Btu/Item
Winter Protection Trucks and Travel Subtotal	1511 24 321	72,491 81,717	3.05x10 <sup>8</sup> 1.32x10 <sup>4</sup> \$3.13x10 <sup>5</sup>	2.21x10 <sup>8</sup> 1.08x10 <sup>9</sup> 1.53x10 <sup>10</sup> Btu
<u>Site Preparation</u>				
Clear Reservoir Basin	29	61,453	2.55x10 <sup>4</sup>	1.57x10 <sup>9</sup>
Clear Dam Foundations	29	61,453	9.4x10 <sup>3</sup>	5.77x10 <sup>8</sup>
River Diversion	Bell	6.36x10 <sup>4</sup> Btu/cy	300,000cy	1.91x10 <sup>10</sup>
Subtotal			1.34x10 <sup>5</sup>	2.12x10 <sup>10</sup>
Excavate Cutoff Trench	Bell	6.36x10 <sup>4</sup> Btu/cy	80,000 cy	5.09x10 <sup>9</sup>
Dewatering	4617 325	121,420	4.07x10 <sup>4</sup>	4.95x10 <sup>9</sup>
Rock Abutment Exc.	Bell	6.36x10 <sup>4</sup> Btu/cy	2,000 cy	1.27x10 <sup>8</sup>
Earth Spillway Exc.	Bell	6.36x10 <sup>4</sup> Btu/cy	1,000 cy	6.36x10 <sup>7</sup>
Rock Exc.	Bell	6.36x10 <sup>4</sup> Btu/cy	200,000 cy	1.27x10 <sup>10</sup>
Subtotal			\$4.878x10 <sup>5</sup>	2.29x10 <sup>10</sup>
<u>Embankment</u>				
Compacted Rockfill	Bell	6.36x10 <sup>4</sup> Btu/cy	110,000 cy	7x10 <sup>9</sup>
Rip-rap Truck Dumped		6.36x10 <sup>4</sup> Btu/cy	90,000 cy	5.72x10 <sup>9</sup>
Compacted Earth Fill		6.36x10 <sup>4</sup> Btu/cy	1,500,000 cy	9.54x10 <sup>10</sup>
Granular Zone Fill		6.36x10 <sup>4</sup> Btu/cy	200,000 cy	1.27x10 <sup>10</sup>
Subtotal			\$1.26x10 <sup>6</sup>	1.2084x10 <sup>11</sup>
<u>Concrete</u>				
Grout Foundation	163	113,551	1.37 x 10 <sup>5</sup>	1.56x10 <sup>10</sup>
Connections	163	113,551	4.07x10 <sup>3</sup>	4.63x10 <sup>8</sup>
Cement Sacks	153	501,726	7.64x10 <sup>4</sup>	3.83x10 <sup>9</sup>
Concrete Spillways	Bell	2.43x10 <sup>7</sup> Btu/cy	10,400 cy	2.53x10 <sup>11</sup>
Concrete Penstock Encasement	Bell	2.43x10 <sup>7</sup> Btu/cy	4,700 cy	1.14x10 <sup>11</sup>
Concrete Fill	Bell	2.43x10 <sup>7</sup> Btu/cy	500 cy	1.22x10 <sup>10</sup>
Concrete Out/inlet	Bell	2.43x10 <sup>7</sup> Btu/cy	1,000 cy	2.43x10 <sup>10</sup>

APPENDIX 5 (continued)

Component	Source	Conversion (Btu/\$)	1967 Dollars or Cubic Yards	Btu/Item
Concrete Reinforce- ment Bars	Hannon	15,564 Btu/lb	2.55x10 <sup>6</sup> lb	3.99x10 <sup>10</sup>
Concrete Intake Tower	Bell	2.43x10 <sup>7</sup> Btu/cy	1,000 cy	2.43x10 <sup>10</sup>
Overflow Wier	Bell	2.43x10 <sup>7</sup> Btu/cy	2,800 cy	6.8x10 <sup>10</sup>
Operating Platform for Gate	163	113,551	2.55x10 <sup>3</sup>	2.89x10 <sup>8</sup>
Subtotal			\$2.262x10 <sup>6</sup>	5.3598x10 <sup>11</sup>
<u>Control Works</u>				
Steel Pipe 36"	3317 175	227,392	2.81x10 <sup>4</sup>	7.803x10 <sup>9</sup>
HB Valve 36"	3317 175	277,392	4.583x10 <sup>4</sup>	1.27x10 <sup>10</sup>
Trash Rack and Misc. Mat.	3317 175	277,392	7.64x10 <sup>3</sup>	2.12x10 <sup>9</sup>
Abutment and Toe Drain	3317 175	277,392	2.04x10 <sup>4</sup>	5.65x10 <sup>9</sup>
Steel Gates	3442 199	123,997	3.06x10 <sup>4</sup>	3.79x10 <sup>9</sup>
Subtotal			\$1.33x10 <sup>5</sup>	3.207x10 <sup>10</sup>
<u>Access Roads</u>				
Bridge at Spillway	3411 198	131,635	4.07x10 <sup>4</sup>	5.36x10 <sup>9</sup>
Road at Dam (Alt. A)	26	125,758	2.29x10 <sup>4</sup>	2.88x10 <sup>9</sup>
Road Stabilized	29	61,453	4.15x10 <sup>4</sup>	2.55x10 <sup>9</sup>
Road Improved	29	61,453	2.68x10 <sup>4</sup>	1.65x10 <sup>9</sup>
Subtotal			\$1.319x10 <sup>5</sup>	1.244x10 <sup>10</sup>
Totals			4.72x10 <sup>6</sup>	7.6x10 <sup>11</sup> Btu
Design Contingency	5% Gillard \$/GNP	1.925x10 <sup>4</sup>	2.36x10 <sup>5</sup>	4.55x10 <sup>9</sup>
Design Fees	5% 344	28,103	2.48x10 <sup>5</sup>	6.97x10 <sup>9</sup>
GRAND TOTALS			\$5.2x10 <sup>6</sup>	7.72x10 <sup>11</sup> Btu
Annual Power Produced at Hydroelectric Power Plant		3,413 Btu/KWH	31.4 million KWH	1.1x10 <sup>11</sup> Btu
<u>ALTERNATIVE B ACCESS ROAD</u>				
New Road	26	125,758	7.73x10 <sup>5</sup>	9.72x10 <sup>10</sup>
Bridge at Spillway	3441 198	131,635	1.38x10 <sup>5</sup>	1.82x10 <sup>10</sup>
Total (with Option)			\$9.11x10 <sup>5</sup>	1.15x10 <sup>11</sup>

# APPENDIX 5 (continued)

APPENDIX 5 (continued)

Component	Source	Conversion (Btu/\$)	1967 Dollars or Cubic Yards	Btu/Item
<u>ALTERNATIVE 3 - Hell's Hole Reservoir</u>				
54" Water Line Trench Excavation	Bell	277,392 6.36x10 <sup>4</sup> Btu/cy	2.66x10 <sup>5</sup> 6,250 cy	7.39x10 <sup>10</sup> 3.98x10 <sup>8</sup>
Drilling and Blast- ing Rock	Bell	6.36x10 <sup>4</sup> Btu/cy	3,125 cy	1.99x10 <sup>8</sup>
Backfill	Bell	6.36x10 <sup>4</sup> Btu/cy	4,483 cy	2.85x10 <sup>8</sup>
Site Preparation Excavation	Bell	61,453 636x10 <sup>4</sup> Btu/cy	5.11x10 <sup>4</sup> 282,500 cy	3.14x10 <sup>9</sup> 1.8x10 <sup>10</sup>
Embankment	Bell	636x10 <sup>4</sup> Btu/cy	4,600,000 cy	2.93x10 <sup>11</sup>
Concrete	Bell	2.43x10 <sup>7</sup> Btu/cy	6,500 cy	1.58x10 <sup>11</sup>
Grouting	163	113,551 See Key	1.35x10 <sup>5</sup>	1.53x10 <sup>10</sup>
Control Works			1.3x10 <sup>5</sup>	1.11x10 <sup>10</sup>
Pumps and Accessories	237	59,006	4.74x10 <sup>5</sup>	2.8x10 <sup>10</sup>
Pump Building	23	59,340	3.64x10 <sup>4</sup>	2.16x10 <sup>9</sup>
Pump Building Earthwork	Bell	6.36x10 <sup>4</sup> Btu/cy	504 cy	3.21x10 <sup>7</sup>
Pump Building Concrete	Bell	2.43x10 <sup>7</sup> Btu/cy	65 cy	1.58x10 <sup>9</sup>
<u>Settling Basin</u>				
Earthwork	Bell	6.36x10 <sup>4</sup> Btu/cy	30,000 cy	1.9x10 <sup>9</sup>
Plastic Liner	133	226,289	3.82x10 <sup>4</sup>	8.64x10 <sup>9</sup>
Concrete Wier	Bell	2.43x10 <sup>7</sup> Btu/cy	144	3.5x10 <sup>9</sup>
Steel Gates	199	123,997	9.2x10 <sup>3</sup>	1.14x10 <sup>9</sup>
<u>Reserve Pond</u>				
Earthwork	Bell	6.36x10 <sup>4</sup> Btu/cy	26,000 cy	1.65x10 <sup>9</sup>
Plastic Liner	133	226,289	3.85x10 <sup>4</sup>	8.71x10 <sup>9</sup>
Inlet Works	Bell	2.43x10 <sup>7</sup> Btu/cy	899 cy	2.16x10 <sup>10</sup>
<u>Roads</u>				
Improve	29	61,453	4.05x10 <sup>5</sup>	2.49x10 <sup>10</sup>
New	26	125,758	2.49x10 <sup>5</sup>	3.13x10 <sup>10</sup>

APPENDIX 5 (continued)

Component	Source	Conversion (Btu/\$)	1967 Dollars or Cubic Yards	Btu/Item
Work Description				
Power Transmission Line	25	85,922	1.47x10 <sup>4</sup>	1.26x10 <sup>9</sup>
Subtotal			\$8.29x10 <sup>6</sup>	7.09x10 <sup>11</sup>
<u>Contingencies</u>				
10% Total Engineering	344	28,103	8.29x10 <sup>5</sup>	2.33x10 <sup>10</sup>
20% Total General	Gillard	1.925x10 <sup>4</sup>	1.66x10 <sup>6</sup>	3.19x10 <sup>10</sup>
Total			\$1.08x10 <sup>7</sup>	7.64x10 <sup>11</sup>
Annual Power Use (assumes pumping 138 cfs for 1 month per year)		3,413 Btu/KWH	3.71x10 <sup>6</sup> KWH	1.26x10 <sup>10</sup>
<u>ALTERNATIVE 4 - Pumping From Green River</u>				
54" Water Line Trench Excavation	Bell	3317 277,392 6.36x10 <sup>4</sup> Btu/cy	1.36x10 <sup>7</sup> 319,000 cy	3.77x10 <sup>12</sup> 2.03x10 <sup>10</sup>
Drilling and Blasting Rock	Bell	6.36x10 <sup>4</sup> Btu/cy	159,500 cy	1.01x10 <sup>10</sup>
Backfill	Bell	6.36x10 <sup>4</sup> Btu/cy	228,800 cy	1.46x10 <sup>10</sup>
Pumps and Accessories	237	59,006	1.92x10 <sup>6</sup>	1.13x10 <sup>11</sup>
Pump Building	23	59,340	4.1x10 <sup>4</sup>	2.43x10 <sup>9</sup>
Pump B. Earthwork	Bell	6.36x10 <sup>4</sup> Btu/cy	415 cy	2.64x10 <sup>7</sup>
Pump B. Concrete	Bell	2.43x10 <sup>7</sup> Btu/cy	88 cy	2.14x10 <sup>9</sup>
<u>Settling Basin</u>				
Earthwork	Bell	6.36x10 <sup>4</sup> Btu/cy	30,000 cy	1.91x10 <sup>9</sup>
Plastic Liner	133	226,289	3.82x10 <sup>4</sup>	8.64x10 <sup>9</sup>
Concrete Wier	Bell	2.43x10 <sup>7</sup> Btu/cy	144 cy	3.5x10 <sup>9</sup>
Steel Gates	199	123,997	9.2x10 <sup>3</sup>	1.14x10 <sup>9</sup>
<u>Reserve Pond</u>				
Earthwork	Bell	6.36x10 <sup>4</sup> Btu/cy	26,000 cy	1.65x10 <sup>9</sup>
Plastic Liner	133	226,289	3.85x10 <sup>4</sup>	8.71x10 <sup>9</sup>

# APPENDIX 5 (concluded)

## APPENDIX 5 (continued)

Component	Source	Conversion (Btu/\$)	1967 Dollars or Cubic Yards	Btu/Item
<u>Inlet Works</u>	Bell	2.43x10 <sup>7</sup> Btu/cy	889 cy	2.16x10 <sup>10</sup>
Subtotal			\$1.81x10 <sup>7</sup>	3.98x10 <sup>12</sup> Btu
Contingencies				
20% Total (General)	Gillard	1.92x10 <sup>4</sup>	3.62x10 <sup>6</sup>	6.95x10 <sup>10</sup>
10% Total	344	28,103	1.81x10 <sup>6</sup>	5.09x10 <sup>10</sup>
(Engineering)				
Total Cost			\$2.35x10 <sup>7</sup>	4.1x10 <sup>12</sup> Btu
Annual Power Use (assumes pumping, 97 cfs continuously)	Hook	3,413 Btu/KWH	1.37x10 <sup>8</sup> KWH	4.68x10 <sup>11</sup> Btu

### ALTERNATIVE 5 - Green and White River Pumping

Place 36" Water Line	175	277,392	7.64x10 <sup>6</sup>	2.12x10 <sup>12</sup>
Trench Evacuation	Bell	6.36x10 <sup>4</sup> Btu/cy	204,160 cy	1.3x10 <sup>10</sup>
Drilling and Blasting Rock	Bell	6.36x10 <sup>4</sup> Btu/cy	102,080 cy	6.49x10 <sup>9</sup>
Backfill	Bell	6.36x10 <sup>4</sup> Btu/cy	164,073 cy	1.04x10 <sup>10</sup>
Pumps and Access- ories	237	59,006	1.92x10 <sup>6</sup>	1.13x10 <sup>11</sup>
Pump Building	23	59,340	4.1x10 <sup>4</sup>	2.43x10 <sup>9</sup>
Pump Building	Bell	6.36x10 <sup>4</sup> Btu/cy	415 cy	2.64x10 <sup>7</sup>
Earthwork				
Pump Building	Bell	2.43x10 <sup>7</sup> Concrete	88 cy	2.14x10 <sup>9</sup>
<u>Settling Basin</u>				
Earthwork	Bell	6.36x10 <sup>4</sup> Btu/cy	30,000 cy	1.91x10 <sup>9</sup>
Plastic Liner	133	226,289	3.82x10 <sup>4</sup>	8.64x10 <sup>9</sup>
Concrete Wler	Bell	2.43x10 <sup>7</sup> Btu/cy	144 cy	3.5x10 <sup>9</sup>
Steel Gates	199	123,997	9.2x10 <sup>3</sup>	1.14x10 <sup>9</sup>
<u>Reserve Pond</u>				
Earthwork	Bell	6.36x10 <sup>4</sup> Btu/cy	26,000 cy	1.65x10 <sup>9</sup>

## APPENDIX 5 (concluded)

Component	Source	Conversion (Btu/\$)	1967 Dollars or Cubic Yards	Btu/Item
Plastic Liner	133	226,289	3.8x10 <sup>4</sup>	8.71x10 <sup>9</sup>
Inlet Works	Bell	2.43x10 <sup>7</sup> Btu/cy	889 cy	2.16x10 <sup>10</sup>
Subtotal			\$1.14x10 <sup>7</sup>	2.31x10 <sup>12</sup>
Contingencies				
20% Total (General)	Gillard	1.925x10 <sup>4</sup>	2.27x10 <sup>6</sup>	4.38x10 <sup>10</sup>
10% Total	344	28,103	1.14x10 <sup>6</sup>	3.2x10 <sup>10</sup>
(Engineering)				
Total Cost			\$1.48x10 <sup>7</sup>	2.39x10 <sup>12</sup> Btu
Annual Power Use (assumes pumping 97 cfs for 1 month per year)		3,533 Btu/KWH	3.47x10 <sup>10</sup> KWH	1.18x10 <sup>11</sup> Btu

# APPENDIX 6

## APPENDIX 6

### Cost Analysis Information By Alternative

TABLE A

#### Summary of Alternatives

Alternative	Construction Cost		Annual Power Cost (\$/yr)	Total Annual Cost (\$/yr)	Quantity of Water Supplied (ac-ft)	Cost of Water (\$/ac-ft/yr)
	Total (\$)	Annual (\$/yr)				
1. White River Dam	20,000,000	2,400,000	a--	2,400,000	75,000	32
3. Hell's Hole Canyon Dam to Augment White River	23,400,000	2,820,000	60,000	2,880,000	25,000	111
4. Pumping From Green River	51,200,000	6,170,000	2,060,000	8,230,000	70,000	118
5. Pumping From Green River to Augment White River	41,000,000	4,940,000	520,000	5,460,000	70,000	78

Source: B10/WEST, 1980 and, Utah Division of Water Resources, 1981.

<sup>a</sup>Annual power income of approximately \$1,150,000 (based on \$0.04 per kWh) is not included in the comparison as it may not be applied to the water cost. Rather, it may be returned to the state water fund directly as a separate item.

This is a uniform approach for comparing costs. These figures are preliminary estimates and do not necessarily reflect actual contract prices for construction and operation or prices set by the Utah Division of Water Resources for sale of water.

## APPENDIX 6 (continued)

TABLE B

### Cost Analysis Information By Alternative ALTERNATIVE 1: White River Dam and Reservoir

Work Description	Quantity	Unit Cost (\$)	Total Estimated Cost (\$)
1. General Conditions <sup>a</sup>	1	667,731.00	667,731
2. Site Preparation			
Clear Reservoir Basin	200 ac.	276.00	55,200
Clear Dam Foundation	24 ac.	822.80	19,747
River Diversion	300,000 cy	0.71	213,000
3. Excavation			
Excavate Cutoff Trench	80,000 cy	1.31	104,800
Dewatering	1	200,000.00	200,000
Rock Abutment Excavation	2,000 cy	10.05	20,100
Earth Spillway Excavation	1,000 cy	1.31	1,310
Rock Excavation	200,000 cy	10.05	2,010,000
4. Embankment			
Compacted Rock Fill	110,000 cy	0	0
Rip-Rap Truck Dumped	90,000 cy	15.45	1,390,500
Compacted Earth Fill	1,500,000 cy	1.85	2,775,000
Granular Zone Fill	200,000 cy	2.00	400,000
5. Concrete	1	4,819,679.00	4,819,679
6. Control Works	1	282,371.00	282,371
7. Access Roads	1	281,232.00	281,232
8. New Bridge and Highway Relocation	1	1,085,000.00	1,085,000
9. Land Acquisition	1	705,250.00	705,000
Subtotal			15,030,670
Contingencies, Engineering, Etc.			3,442,574
Estimated Total Costs (June 1979)			18,473,244
Annual Cost (I = 12%, N = 50 yr.)			2,224,500

\$32/acre-foot/year.

<sup>a</sup>Inspection, survey, maps, staking, engineering.

# APPENDIX 6 (continued)

## APPENDIX 6 (continued)

TABLE C

Cost Analysis Information By Alternative  
ALTERNATIVE 3: Hell's Hole Dam and Reservoir<sup>a</sup>

Work Description	Quantity	Unit Cost (\$)	Total Estimated Cost (\$)
<b>Pipeline</b>			
1. Place 54" Diameter Water Line	3,000 ft.	193.00	579,000
2. Trench Excavation	6,250 yd <sup>3</sup>	0.90	6,000
3. Drilling and Blasting Rock	3,125 yd <sup>3</sup>	27.00	84,000
4. Backfill	4,483 yd <sup>3</sup>	1.00	5,000
<b>Dam</b>			
5. Site Preparation	300 ac.	370.00	111,000
6. Excavation	282,500 yd <sup>3</sup>	7.56	2,136,000
7. Embankment	4,600,000 yd <sup>3</sup>	2.38	10,948,000
8. Concrete for Spillway	6,500 yd <sup>3</sup>	217.00	1,408,000
9. Grouting	45,000 ft.	6.51	293,000
10. Control Works	1	282,000.00	282,000
<b>Pump Station</b>			
11. Pumps and Accessories	10	103,000.00	1,030,000
12. Pump Building	1	94,000.00	94,000
13. Settling Basin	1	174,000.00	174,000
14. Inlet Works	1	200,000.00	200,000
15. Access Road	1		654,000
16. Power Transmission Line	16,000 ft.	2.00	32,000
Subtotal			18,016,000
Contingencies, Engineering, etc @ 30% Of the Subtotal			5,405,000
Estimated Total Costs (June 1979)			23,421,000
Annual Cost (I - 12%, N - 50 yr.)			2,820,000
Annual Power Cost (Assumes pumping 1 mo/yr at 138 cfs electrical costs are \$0.015/KWh)			55,600

## Footnotes

<sup>a</sup>This computation is based on the following component construction requirements:

Pumping Stations located on White River with settling basin, diversion structures, inlet works, etc.

Pipeline consists of a 3,000-foot-long, 54-inch diameter steel pipe with welded joints. Fifty percent rock excavation and 50 percent common excavation assumed.

Dam - The embankment would contain 4,450,000 cy including 80,000 cy in the cutoff trench. The height would be approximately 294 feet for a 25,000 acre-foot reservoir capacity. The outlet capacity of 300 cfs was assumed. (For a 70,000 acre-foot capacity reservoir, a 415-foot-high dam would be required.)

Access Road - Improvement of 13,000 feet of an existing road and construction of 8,000 feet of new road would be required for access to the dam.

Transmission Line - 16,000 feet of line to supply power for the pumps is assumed.

<sup>b</sup>Based on historical hydrologic records, pumping would occur nearly every year. The cost and energy analysis assumed pumping continuously for 1 month each year to simplify the analysis and to allow for future water use in Colorado which could increase the frequency of pumping.

# APPENDIX 6 (continued)

APPENDIX 6

TABLE D

Cost Analysis Information By Alternative  
ALTERNATIVE 4: Pumping Water From the Green River<sup>a</sup>

Work Description	Quantity	Unit Cost (\$)	Total Estimated Cost (\$)
1. Place 54" Diameter Water Line	153,120 ft.	193.00	29,552,000
2. Trench Excavation	319,000 yd <sup>3</sup>	0.90	287,000
3. Drilling and Blasting Rock	159,500 yd <sup>3</sup>	27.00	4,307,000
4. Backfill	228,300 yd <sup>3</sup>	1.00	229,000
5. Pumps and Accessories	38	110,000.00	4,181,000
6. Pump Building	3	109,440.00	328,000
7. Settling Basin	1	174,000.00	174,000
8. Reserve Pond	1	118,000.00	118,000
9. Inlet Works	1	200,000.00	200,000
Subtotal			39,376,000
Contingencies, Engineering, etc @ 30% of the Subtotal			11,813,000
Estimated Total Costs (June 1979)			51,189,000
Annual Cost (I - 12%, N - 50 yr.)			6,164,000
Annual Power Cost (assumes continuous pumping of 97 cfs at \$0.015/KWH)			2,058,218

<sup>a</sup>This computation is based on the following component construction requirements:  
Pumping Station - One located on the Green River with diversion structures, inlet works, etc; one located about 1,000 ft. from the first station with a settling basin; and one located about 4.5 miles from the second station with a reserve pond.

Pipeline - Consists of a 29-mile-long, 54-inch diameter steel pipe with welded joints. Fifty percent rock excavation and 50 percent common excavation assumed.

APPENDIX 6

TABLE E

Cost Analysis Information By Alternative  
ALTERNATIVE 5: Pumping Water From the White River  
and Supplementing With Water Pumped From the Green River<sup>a</sup>

Work Description	Quantity	Unit Cost (\$)	Total Estimated Cost (\$)
1. Place 36" Diameter Water Line	153,120 ft.	108.00	16,612,000
2. Trench Excavation	204,160 yd <sup>3</sup>	0.90	184,000
3. Drilling and Blasting Rock	102,080 yd <sup>3</sup>	27.00	2,756,000
4. Backfill	164,073 yd <sup>3</sup>	1.00	164,000
5. Pumps and Accessories	7	1,442,000.00	10,094,000
6. Pump Building	7	109,440.00	766,080
7. Settling Basin	1	174,000.00	174,000
8. Reserve Pond	5	118,000.00	590,000
9. Inlet Works	1	200,000.00	200,000
Subtotal			31,540,000
Contingencies, Engineering, etc @ 30% of the Subtotal			9,462,000
Estimated Total Costs (June 1979)			41,002,000
Annual Cost (I - 12%, N - 50 yr.)			4,937,000
Annual Power Cost (assumes pumping 1 mo./yr. at 97 cfs at \$0.015/KWH)			520,600

\$78/acre-feet/yr.

## APPENDIX 6 (concluded)

### Footnotes

<sup>a</sup>This computation is based on the following component construction requirements:

**Pumping Station** - The first station would be located on the Green River and would consist of diversion structures, inlet works, etc; the second would be located about 1,000 feet from the first with a settling basin; the third, about 2.5 miles from second with a reserve pond; the fourth, about 3.0 miles from the third with a reserve pond; the fifth, about 4.0 miles from the fourth with a reserve pond; the sixth, about 10.5 miles from the fifth with a reserve pond; the seventh, about 3.0 miles from the sixth with a reserve pond.

**Pipeline** - Consists of a 29-mile-long, 36-inch diameter steel pipe with welded joints. Fifty percent rock excavation and 50 percent common excavation assumed.

<sup>b</sup>Based on historical hydrologic records, pumping would occur nearly every year. The cost and energy analysis assumed pumping continuously for 1 month each year to simplify the analysis and to allow future water use in Colorado which could increase the frequency of pumping.

## APPENDIX 7

### APPENDIX 7

#### Wildlife in the Project Area

TABLE A

Mammals, Their Status, Abundance and Habitat Preference  
in the General Area of the White River Dam

Status	Abundance	Habitat Type
P - Permanent Resident	C - Common U - Uncommon	R - Riparian (Cottonwood)
S - Summer Resident	R - Rare	W - Wetlands, Ponds, Lakes
T - Transient	O - Occasional UK - Unknown	OS - Desert Shrub (Saltbush, Sagebrush, Greasewood)
		P-J - Pinyon-Juniper Woodland
		L - Literature
		O - Observed in Impact Area
		- - Absent

Species	Status	Abundance	R	W	OS	P-J
Apache Pocket Mouse	P	C-U	0	-	0	0
Badger	P	U-R	0	L	0	0
Beaver	P	C-U	0	-	-	-
Big Brown Bat	S	C	L	-	-	-
	S	R	-	0	-	-
Black Bear	T	R	-	-	L	-
Black-footed Ferret	UK	UK	-	-	L	-
Black-tailed Jack-rabbit	P	C-R	-	-	0	0
Bobcat	P	U-R	0	-	-	0
Brazilian Free-tailed Bat	S	O	-	0	-	-
Brush Mouse	P	U-R	0	-	0	-
Bushy-tailed Woodrat	P	C-R	0	-	0	0
California Myotis	S	U	-	0	-	-
Canon Mouse	P	U	-	-	-	0
Colorado Chipmunk	P	U-R	-	-	-	0
Coyote	P	U	0	L	0	0
Deer Mouse	P	C-R	0	L	0	0
Desert Cottontail	P	C-R	0	-	0	0
Desert Woodrat	P	C-R	-	-	0	0
Dwarf Shrew	P	UK	-	-	-	-
Fringed Myotis	S	R	-	-	-	-

(continued)

# APPENDIX 7 (continued)

TABLE A (continued)

Species	Status	Abundance	R	W	OS	P-J
Golden-mantled						
Ground Squirrel	P	C-R	0	-	0	0
Gray Fox	P	U-R	0	-	-	-
Heather Vole	P	U-R	L	-	L	-
Hoary Bat	S, T	C	L	0	-	-
House Mouse	P	C-R	-	-	-	-
Least Chipmunk	P	C-U	-	-	0	-
Little Brown Bat	S	U	L	0	-	-
Long-eared Myotis	S	U	-	0	-	-
Long-legged Myotis	S	U	-	0	-	-
Long-tailed Vole	P	U-R	L	-	-	-
Long-tailed Weasel	P	R	-	-	0	-
Masked Shrew	P	UK	-	-	-	-
Merriam's Shrew	P	UK	-	-	-	-
Mink	P	U-R	L	-	-	-
Mountain Cottontail	P	C-U	-	-	L	L
Mountain Lion	T	R	-	-	0	-
Mule Deer	P	C-U	0	L	0	0
Muskrat	P	U-R	0	L	-	-
Northern Grass-						
hopper Mouse	P	R-O	-	-	L	-
Northern Pocket						
Gopher	P	U-R	-	-	L	-
Olive-backed Pocket						
Mouse	P	R-O	-	-	L	L
Ord's Kangaroo Rat	P	C-U	0	-	0	0
Otter	UK	UK	L	-	-	-
Pallid Bat	S	U	-	0	-	-
Pinon Mouse	P	U-R	-	-	0	0
Porcupine	P	C-R	0	-	0	-
Pronghorn	P	C-U	-	-	0	-
Raccoon	P	U-R	0	L	-	-
Red Fox	P	U	L	-	-	-
Ringtail	P	U-R	-	-	-	-
Rock Squirrel	P	U-R	-	-	0	-
Sagebrush Vole	P	U-R	-	-	L	-
Silver-haired Bat	S, T	C	L	0	-	-
Small-footed Myotis	S	U	L	0	-	-
Spotted Skunk	P	U-R	-	-	L	L
Striped Skunk	P	U	0	-	-	-
Thirteen-lined						
Ground Squirrel	P	U-R	-	-	L	-
Townsend's Big-						
eared Bat	S	R	-	0	-	-
Wandering Shrew	P	UK	-	-	-	-
Water Shrew	P	UK	-	-	-	-
Western Harvest						
Mouse	P	U-R	0	-	0	-
Western Pipistrelle	S	C	L	0	L	-

(continued)

TABLE A (continued)

Species	Status	Abundance	R	W	OS	P-J
White-tailed						
Antelope Squirrel	P	C-R	-	-	0	0
White-tailed Jack-						
rabbit	P	U-R	L	-	0	0
White-tailed						
Prairie Dog	P	C-R	-	-	0	-
Wild Horse	P	U-R	-	-	L	-
Wolverine	UK	UK	-	-	-	-
Yellow-bellied						
Marmot	T	U-R	-	-	0	-
Yuma Myotis	S	U	L	L	-	-

Source: Armstrong 1972, Oarrant 1952, Oarrant et al. 1955, Grant and Kung 1979, Olsen 1973, Perry 1975, Ranck 1961, Smith and Assoc. 1979. Nomenclature: Armstrong 1972.

# APPENDIX 7 (continued)

## Wildlife in the Project Area (continued)

TABLE B

Birds, Their Status, Abundance and Habitat Preference  
in the General Area of the White River Dam

Status	Abundance	Habitat Type
P - Permanent Resident	C - Common	R - Riparian (Cottonwood)
S - Summer Resident	U - Uncommon	W - Wetlands, Ponds, Lakes
- Winter Resident	R - Rare	OS - Desert Shrub
T - Transient	O - Occasional	P-J - Pinyon-Juniper Woodland
		L - Literature
		O - Observed in Impact Area
		- - Absent

Species	Status	Abundance	R	W	OS	P-J
American Avocet	S	U	L	L	-	-
American Bittern	T	U	O	-	-	-
American Coot	S	U	-	L	-	-
American Golden Plover	S	C	-	L	-	-
American Goldfinch	T	U	L	-	-	-
American Kestrel	S, P	U	O	-	-	O
American Redstart	S	C	O	L	O	O
American Robin	S	R	-	L	-	L
American Wigeon	S	C	O	L	-	O
American Wigeon	T	U	L	L	-	-
Ash-throated Flycatcher	T	C	O	-	-	O
Baird's Sandpiper	S	C	O	-	-	O
Bald Eagle	T	U	L	L	-	-
Bank Swallow	W	U	O	L	O	-
Barn Swallow	S	U	L	-	-	-
Barrow's Goldeneye	S	C	L	L	-	-
Belted Kingfisher	T, W	U	L	L	-	-
Bendire's Thrasher	P	U	O	-	-	-
Bewick's Wren	T	O	-	-	O	-
Black Rosy Finch	S	U	O	-	O	O
Black Tern	S	U	L	L	-	-
Black-bellied Plover	S	U	L	L	-	-
Black-billed Magpie	T	U	-	L	-	-
Black-capped Chickadee	P	C	O	L	O	O

(continued)

TABLE B (continued)

Species	Status	Abundance	R	W	OS	P-J
Black-chinned Hummingbird	S	U	O	-	-	L
Black-crowned Night Heron	S	U	-	L	-	-
Black-headed Grosbeak	S	U	O	-	-	-
Black-necked Stilt	S	U	L	L	-	-
Black-tailed Gnatcatcher	S	O	O	-	-	O
Black-throated Gray Warbler	S	C	O	-	-	O
Black-throated Sparrow	S	C-U	O	-	O	-
Blue Grosbeak	S	U	O	-	-	-
Blue-gray Gnatcatcher	S	C	O	-	-	O
Blue-winged Teal	T	U	O	L	-	-
Bobolink	T	O	-	L	-	-
Brewer's Blackbird	P	C	O	L	O	-
Brewer's Sparrow	S	C-R	O	-	O	O
Broad-tailed Hummingbird	S	C	O	L	O	O
Brown Creeper	T	U	O	-	-	-
Brown-headed Cowbird	S	C	O	L	-	-
Bufflehead	T	U	L	L	-	-
Burrowing Owl	P	U	-	-	O	-
Bushtit	T	U	O	-	-	O
California Gull	T	U	L	L	-	-
California Quail	T	U	L	-	O	O
Canada Goose	P	C	L	L	-	-
Canon Wren	S	C	O	-	-	-
Canvasback	P	U	O	-	-	O
Caspian Tern	T	U	L	L	-	-
Cedar Waxwing	T	U	O	-	-	-
Chesnut-sided Warbler	T	O	L	-	-	-
Chipping Sparrow	S	C-U	O	-	-	O
Chukar	P	U	L	-	O	L
Cinnamon Teal	S	C	L	L	-	-
Clark's Nutcracker	T	U	O	-	-	-
Cliff Swallow	P	C	O	-	-	O
Common Crow	P	C	L	L	-	-
Common Flicker	T	R	O	-	-	O
Common Goldeneye	P, W	U	L	L	-	-
Common Loon	T, W	U	L	L	-	-
Common Merganser	W, T	U	O	L	-	-
Common Nighthawk	S	C	O	L	O	O

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(continued)

# APPENDIX 7 (continued)

TABLE B (continued)

Species	Status	Abundance	R	W	OS	P-J
Common Raven	P	C	-	-	0	0
Common Snipe	S	C	L	L	-	-
	T	U	0	-	-	-
Common Yellowthroat	S	U	0	L	-	-
Cooper's Hawk	P, S	C	0	L	-	-
Dark-eyed Junco	W	C	0	-	0	0
Oakleaf-crested						
Cormorant	T	R	L	-	-	-
Downy Woodpecker	P	C	0	-	-	-
Ounlin	T	R	L	-	-	-
Eared Grebe	S	C	L	L	-	-
Eastern Kingbird	S	U	0	-	0	-
Eastern Phoebe	T	R	0	-	0	-
Ferruginous Hawk	T, S	R	-	-	0	-
Forster's Tern	S	U	L	L	-	-
Franklin's Gull	T	L	L	L	-	-
Gadwall	S	C	L	L	-	-
	T	U	0	-	-	-
Golden Eagle	P	C	0	-	0	0
Goshawk	W	U	0	-	-	0
Gray Catbird	S	U	L	L	-	-
Gray Flycatcher	S	C	0	-	-	0
Gray-crowned Rosy						
Finch	W	U	0	-	0	0
Gray-headed Junco	T	U	0	-	-	-
Great Egret	T	R	-	L	-	-
Great Blue Heron	S	U	0	L	-	-
Great Horned Owl	P	C	0	-	0	0
Greater Yellowlegs	T	U	0	L	-	-
Green-tailed Towhee	T	U	0	-	-	-
Green-winged Teal	S	C	L	L	-	-
	T	U	0	-	-	-
Hairy Woodpecker	P	C	0	-	-	-
Herrin Thrush	T	U	0	L	-	-
Horned Grebe	T	R	L	L	-	-
Horned Lark	P	C	-	-	0	0
House Finch	S	C	0	L	-	0
House Sparrow	P	C	L	-	-	-
House Wren	S	U	0	-	-	-
Killdeer	S	C	0	L	0	-
Lark Bunting	S	U	-	-	0	-
Lark Sparrow	S	C-U	0	-	0	0
Lazuli Bunting	S	U	0	-	-	-
Least Sandpiper	T	C	L	L	-	-
Lesser Goldfinch	T	R	0	-	-	-
Lesser Scaup	T	U	L	L	-	-
Lesser Yellowlegs	T	C	L	L	-	-
Lewis' Woodpecker	S	R	L	-	-	-
Loggerhead Shrike	S, P	C	-	-	0	-
Long-billed Curlew	S, T	U	L	L	-	-

(continued)

TABLE B (continued)

Species	Status	Abundance	R	W	OS	P-J
Long-billed						
Owl	T	U	L	L	-	-
Long-billed Marsh						
Wren	S	R	-	0	-	-
Long-eared Owl	P	U	0	L	L	-
MacGillivray's						
Warbler	S	U	0	L	-	-
Mallard	P	C	L	L	-	-
	T	U	0	-	-	-
Marbled Godwit	T	U	L	L	-	-
Merlin	T	R	0	-	-	-
Mockingbird	S	U	-	-	0	-
Mountain Bluebird	S, P	U	0	-	0	0
Mountain Chickadee	T	U	0	-	-	0
Mountain Plover	T	R	-	-	L	-
Mourning Dove	S	C	0	L	0	0
Northern Harrier						
(Marsh Hawk)	P	U	L	L	0	-
Northern Oriole	S	C	0	L	-	-
Northern Phalarope	T	C	-	L	-	-
Northern Shoveler	S	C	L	L	-	-
	T	U	0	-	-	-
Northern Shrike	W	U	0	-	-	-
Northern						
Waterthrush	T	R	L	-	-	-
Olive-sided						
Flycatcher	T	U	0	-	-	-
Orange-crowned						
Warbler	S	U	0	L	0	0
Osprey	S	U	L	-	-	-
Peregrine Falcon	T, S	R	0	-	0	-
Pied-billed Grebe	T	R	0	L	-	-
Pine Siskin	W, T	U	0	-	-	0
Pinon Jay	P	C	-	-	0	0
Pintail	S	C	L	L	-	-
	T	U	0	-	-	-
Plain Titmouse	P	C	-	-	-	0
Poorwill	S	U	-	-	-	0
Prairie Falcon	P	U	-	-	0	0
Red-breasted						
Merganser	T	U	L	L	-	-
Red-breasted						
Nuthatch	T	U	0	-	-	0
Red-eyed Vireo	T	U	0	-	-	-
Red-headed						
Woodpecker	T	R	L	-	-	-
Red-tailed Hawk	P, S	C	0	-	0	0
Red-winged						
Blackbird	P	C	L	L	-	-
	T	U	0	-	-	-
Redhead Duck	S	C	L	L	-	-

# APPENDIX 7 (continued)

TABLE B (continued)

Species	Status	Abundance	R	W	DS	P-J
Ring-billed Gull	T	R	L	-	-	-
Ring-necked Duck	T	U	L	L	-	-
Ringnecked Pheasant	P	C	L	L	0	0
		R	0	-	0	-
Rock Dove	P	U	L	-	-	-
Rock Wren	S	C	0	-	0	0
Rose-breasted Grosbeak	T	0	-	-	-	0
Rough-legged Hawk	W	C	0	-	0	0
Rough-winged Swallow	S	C	0	L	-	-
Ruby-crowned Kinglet	T	U	0	-	0	0
Ruddy Duck	T	U	L	L	-	-
Rufous-sided Towhee	S	C	0	-	0	-
Sage Grouse	P	U	-	-	L	-
Sage Sparrow	S	C-U	-	-	0	-
Sage Thrasher	S	C	-	-	0	-
Sanderling	T	U	L	L	-	-
Sandhill Crane	T	C	0	L	-	-
Savannah Sparrow	T	R	-	-	0	-
Say's Phoebe	S	C	0	L	0	0
Scott's Oriole	S	R	-	-	0	0
Screech Owl	P	U	L	L	-	-
Scrub Jay	P	U	0	-	-	0
Semipalmated Plover	T	U	L	-	-	-
Sharp-shinned Hawk	P	U	-	-	0	0
Short-eared Owl	P	U	0	L	0	-
Snow Goose	T	U	-	-	L	-
Snowy Egret	S	U	-	L	-	-
	T	R	0	-	-	-
Snowy Plover	T	R	L	-	-	-
Solitary Sandpiper	T, S	U	-	L	-	-
Solitary Vireo	P	U	0	L	-	-
Song Sparrow	P	U	0	L	-	-
Sora	S	U	-	L	-	-
Spotted Sandpiper	S	C	0	-	-	-
Starling	S	C	0	-	0	-
Swainson's Hawk	T	R	-	-	0	-
Swainson's Thrush	T	U	0	-	-	-
Townsend's Solitaire	T	U	0	-	-	0
Townsend's Warbler	T	U	0	-	-	-
Tree Sparrow	W	U	0	L	-	-
Tree Swallow	S	R	0	-	-	-
Turkey Vulture	S	C	0	L	0	L
Vaux's Swift	T	0	L	-	-	-
Vesper Sparrow	T, S	U	-	-	0	-
Violet-green Swallow	S	U	0	L	0	-

(continued)

TABLE B (continued)

Species	Status	Abundance	R	W	DS	P-J
Virginia Rail	S	U	L	0	-	-
Virginia's Warbler	S	U	0	L	-	-
Warbling Vireo	S	U	0	-	-	-
Water Pipit	T	U	0	-	-	-
Western Bluebird	T	U	0	-	-	-
Western Grebe	T	U	L	L	-	-
Western Kingbird	S	U	0	L	0	-
Western Meadowlark	P	C	L	L	L	-
	S	C	0	-	0	-
Western Sandpiper	T	U	L	-	-	-
Western Tanager	S	U	0	-	-	L
Western Wood Pewee	S	U	0	-	-	0
Whistling Swan	T	R	-	L	-	-
White Pelican	T	R	-	L	-	-
White-breasted Nuthatch	T	U	0	-	-	-
White-crowned Sparrow	S, T	U	0	L	-	-
White-faced Ibis	T	U	-	L	-	-
White-throated Swift	S	C	0	-	-	0
Whooping Crane	T	R	0	-	-	-
Willet	T	U	L	L	-	-
Willow Flycatcher	S	C	0	L	-	-
Wilson's Phalarope	S	C	L	L	-	-
Wilson's Warbler	T	C	0	L	-	-
Yellow Warbler	S	C	0	L	-	-
Yellow-billed Cuckoo	S	U	0	-	-	-
Yellow-bellied Sapsucker	W	U	0	-	-	-
Yellow-breasted Chat	S	C	0	L	-	-
Yellow-headed Blackbird	S	C	L	L	-	-
Yellow-rumped Warbler	S, T	U	0	L	-	0

Sources: Behle and Perry 1975a, b, Grant and Kung 1979, Grant et al. 1980, Hayward 1967, Hayward et al. 1958, 1979, Smith and Assoc. 1979, Twomey 1942. Nomenclature: Behle and Perry 1975a.

# APPENDIX 7 (continued)

## Wildlife in the Project Area (continued)

TABLE C

Relative Abundance and Reproductive Status of  
Fishes in the White River of Utah

Species	Population Status <sup>a</sup>	Reproductive Status
Family Catostomidae - Suckers		
Bluehead Sucker <sup>b</sup> <u>Pantosteus discobolus</u>	C	Yes
Flannelmouth Sucker <sup>b</sup> <u>Catostomus latipinnis</u>	A	Yes
Family Centrarchidae - Sunfishes		
Green Sunfish <u>Lepomis cyanellus</u>	R	?
Smallmouth Bass <u>Micropterus dolomieu</u>	Oc	No
Family Cyprinidae - Minnows		
Bonytail Chub <sup>b</sup> <u>Gila elegans</u>	Oc	No
Carp <u>Cyprinus carpio</u>	C	Yes
Colorado Squawfish <sup>b</sup> <u>Ptychocheilus lucius</u>	R	No
Fathead Minnow <u>Pimephales promelas</u>	A	Yes
Humpback Chub <sup>b</sup> <u>Gila cypha</u>	Oc	No
Red Shiner <u>Notropis lutrensis</u>	A	Yes
Roundtail Chub <sup>b</sup> <u>Gila robusta</u>	A	Yes
Speckled Dace <sup>b</sup> <u>Rhinichthys osculus</u>	A	Yes

(continued)

TABLE C (continued)

Species	Population Status <sup>a</sup>	Reproductive Status
Family Ictaluridae - Catfishes		
Black Bullhead <u>Ictalurus melas</u>	C	?
Channel Catfish <u>Ictalurus punctatus</u>	C	?
Family Salmonidae - Trouts		
Brown Trout <u>Salmo trutta</u>	Oc	No

Source: Utah Division of Wildlife Resources 1976, Lanigan and Berry 1979, Holden and Selby 1979.

<sup>a</sup>A = abundant - The species was collected at will with standard equipment and little effort. Several age groups were present indicating stable reproducing populations. Juveniles were readily taken in one or more habitats by seine.

C = common - The species, especially juveniles, was readily collected. Usually more than one age group was represented, suggesting reproduction in the area.

R = rare - The species was collected occasionally but with no certainty regardless of effort expended.

Oc = occasional - Occurrence of the species was due to stocking or movement into the area during a particular season, such as winter, or only one or two specimens had been collected.

<sup>b</sup>Native.

# APPENDIX 7 (continued)

Wildlife in the Project Area (continued)  
TABLE D

Relative Abundance and Reproductive Status of Fishes  
In the Green River Below Walker Hollow

Species	Population Status <sup>a</sup>	Reproductive Status
Family Catostomidae - Suckers		
Bluehead Sucker <sup>b</sup> <u>Pantosteus discobolus</u>	C-A	Yes
Flannelmouth Sucker <sup>b</sup> <u>Catostomus latipinnis</u>	A	Yes
Mountain Sucker <sup>b</sup> <u>Pantosteus platyrhynchus</u>	Oc	No
Razorback Sucker <sup>b</sup> <u>Xyrauchen texanus</u>	R	?
White Sucker <u>Catostomus commersoni</u>	Oc	No
Family Centrarchidae - Sunfishes		
Green Sunfish <u>Lepomis cyanellus</u>	R	Yes
Largemouth Bass <u>Micropterus salmoides</u>	R	No
Smallmouth Bass <u>Micropterus dolomieu</u>	Oc	No
Family Cottidae - Sculpins		
Mottled Sculpin <sup>b</sup> <u>Cottus bairdi</u>	Oc	No
Family Cyprinidae - Minnows		
Bonytail Chub <sup>b</sup> <u>Gila elegans</u>	R	?
Carp <u>Cyprinus carpio</u>	C-A	Yes
Creek Chub <u>Semotilus atromaculatus</u>	Oc	No

(continued)

TABLE O (continued)

Species	Population Status <sup>a</sup>	Reproductive Status
Colorado Squawfish <sup>b</sup> <u>Ptychocheilus lucius</u>	R	Yes
Fathead Minnow <u>Pimephales promelas</u>	C	Yes
Humboldt Chub <sup>b</sup> <u>Gila cypha</u>	R	Yes
Red Shiner <u>Notropis lutrensis</u>	A	Yes
Redside Shiner <u>Richardsonius balteatus</u>	R	?
Roundtail Chub <sup>b</sup> <u>Gila robusta</u>	C	Yes
Speckled Dace <sup>b</sup> <u>Rhinichthys osculus</u>	C	Yes
Utah Chub <u>Gila atraria</u>	Oc	No
Family Esocidae - Pikes		
Northern Pike <sup>c</sup> <u>Esox lucius</u>	Oc	No
Family Ictaluridae - Catfishes		
Black Bullhead <u>Ictalurus melas</u>	R	Yes
Channel Catfish <u>Ictalurus punctatus</u>	A	Yes

(continued)

## APPENDIX 7 (concluded)

TABLE D (concluded)

Species	Population Status <sup>a</sup>	Reproductive Status
Family Percidae - Perches		
Walleye		
<u>Stizostedion vitreum</u>	Oc	No

Sources: Holden 1977, Holden and Selby 1979b.

<sup>a</sup>A = abundant - The species was collected at will with standard equipment and little effort. Several age groups were present indicating stable reproducing populations. Juveniles were readily taken in one or more habitats by seine.

C = common - The species, especially juveniles, was readily collected. Usually more than one age group was represented, suggesting reproduction in the area.

R = rare - The species was collected occasionally but with no certainty regardless of effort expended.

Oc = occasional - Occurrence of the species was due to stocking or movement into the area during a particular season, such as winter, or only one or two specimens had been collected.

<sup>b</sup>Native.

<sup>c</sup>Northern pike were captured in the Green River in 1976 by the Colorado River Fishes Recovery Team, in 1980 by BIO/MEST at Jensen (Personal communication, Paul B. Holden, BIO/MEST, Inc., Logan, Utah).

## APPENDIX 8

### APPENDIX 8

#### BLM Visual Resource Definitions

##### Scenic Quality

Class A Scenery - Containing interesting rock formations, a variety of contrasting colors of rock, soil, and flowing water, a variety of texture and vegetation forms, lacking man-made intrusions, and unique.

Class B Scenery - Interesting within their settings, but similar to other settings within the region.

Class C Scenery - Lack of interesting landforms or vegetation; the extent of man-made intrusion makes landscape features common within the region.

##### Distance Zones

Foreground/Middleground - The area that can be seen from each travel route for a distance of 3 to 5 miles where management activities might be viewed in detail. The outer boundary of this zone is the point where the texture and form of individual plants are no longer apparent in the landscape.

Background - The remaining area which can be seen from each travel route, approximately 15 miles. This does not include areas in the background which are so far distant that the form or outline are only discernable. To be included within the distance zone, vegetation should be visible at least as patterns of light and dark.

Seldom Seen - Identified through the seen area analysis as unseen or beyond the approximate 15-mile limit from points of observation.

##### Sensitivity Levels

Visual Sensitivity Levels are used to indicate the degree of user interest in visual resources and concern for changes in the existing landscape character. The labels high, medium, and low are assigned according to a set of criteria from BLM Manual 8411.31A.

(continued)

### APPENDIX 8 (concluded)

#### Visual Resource Management Classifications

Class I - This class provides primarily for natural ecological changes; however, it does not preclude limited management activity. Any contrast created within the characteristic environment must not attract attention. It is applied to wilderness areas, some borrow material areas, wild portions of wild and scenic rivers, and other similar situations where management activities are to be restricted.

Class II - Changes in the basic elements (form, line, color, texture) caused by a management activity should not be evident in the characteristic landscape. A contrast may be seen, but should not attract attention.

Class III - Contrasts to the basic elements (form, line, color, texture) caused by a management activity may be evident and begin to attract attention in the characteristic landscape. However, the changes should remain subordinate to the existing characteristic landscape.

Class IV - Contrasts may attract attention and be a dominant feature of the landscape in terms of scale; however, the change should repeat the basic elements (form, line, color, texture) inherent in the characteristic landscape.

Class V - Change is needed or change may add acceptable visual variety to an area. This class applies to areas where the material character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding landscape.

Source: Flores Associates (1979).

## APPENDIX 9

### APPENDIX 9

#### Revegetation Program for Disturbed Areas

Successful revegetation of disturbed sites under the environmental conditions of the White River Dam Project area (limited and erratic precipitation, great temperature extremes, and shallow soils of low fertility and often high salinity) requires a program which proceeds in a logical and coordinated fashion. The proposed program consists of four major components: (1) plant selection; (2) plant propagation; (3) site preparation and field planting; and (4) management of planted areas.

##### Plant Selection

Native plant species are generally preferred because they are adapted to the arid climate of the project area and are best suited to provide the food and habitat requirements of indigenous wildlife. Because ecological tolerances of native species may differ from region to region, and even from site to site, it is desirable that the source of plant materials be as close to the site to be revegetated as possible. Native and non-native plants from outside the immediate project area should not be ignored, but they should first be tested for adaptation before being included in the revegetation program. A variety of plant species and life forms should be planted to provide community diversity and ecological stability. Deep-rooted trees and shrubs help prevent mass soil slippage, while forbs and grasses provide ground cover and reduce surface soil erosion. Plant species should also be selected for their palatability characteristics. Mixtures of plant species may provide a better diet for both livestock and wildlife. Plant species of moderate palatability should be included with highly palatable species to prevent overgrazing.

##### Plant Propagation

An adequate and reliable source of plant material is essential to the project area revegetation program. The most effective planting materials will generally be bare-root or container-grown planting stock rather than seeds due to the poor success of direct seeding on arid sites where 7 to 10 inches (175 to 250 mm) of precipitation occurs. Depending on the plant species, plant materials can be propagated by seed, wildlings (naturally produced seedlings), root sprouts, vegetative stem cuttings, grass sprigs, grass rhizomatous sprouts, and bunch division. Propagation methods, ease of propagation, collection dates, and special treatments for several native plant species in the project area are described by the Institute for Land Rehabilitation (1979a, 1979b). Container-grown plants are expensive, but under adverse growing conditions they provide the best means of establishing vegetation. This is especially evident for plantings made later in the growing season than early spring.

##### Site Preparation and Field Planting

For greatest survival, bare-root stock and wildlings should be planted in early spring while the plants are still dormant. It is necessary that the roots be kept moist and not be allowed to dry while digging, transporting, or planting.

Container stock grown during the winter in the greenhouse should be gradually hardened to external conditions over a several week period if they

### APPENDIX 9 (concluded)

are to be field planted in early spring. Later plantings of container-grown stock do not require the same degree of hardening as early spring plants if the transplants have good root and top development. Small container-grown plants can be planted early in the spring when the soil is moist. Summer and fall plantings require larger transplants grown in larger containers. These later plantings may need supplemental water when planted; the amount depending on the dryness of the soil. Container-grown plants need to be tamped in well to provide a close contact between the potting soil material and the surrounding disturbed soil.

Site preparation on the project area will vary with the type of disturbance, type of soil material, slope, soil compaction, and plant competition. Compacted soil such as a roadway must be loosened to allow for moisture penetration and root growth. Weedy plant competition should be removed and then the area allowed for moisture accumulation. Slopes, basins, furrows, or other techniques for water harvesting or erosion control should be established at the time of following.

Species being planted should fit the habitat as much as possible and blend in with those species growing naturally. Much of the criteria for plant spacing, species selection, and mixing of species can be developed in part from environmental baseline data from Federal Oil Shale Tracts Ua and Ub (VTN Colorado, Inc. 1976). Distance between plants should not exceed average interspace distances found in the surrounding undisturbed area. Direct seeding of arid sites is not generally advised unless soil moisture is high and/or supplemental irrigation is possible. Transplanting of bare root and container-grown species is thus the recommended practice for critical arid sites. Supplemental water and fertilizer are recommended primarily when the soil is dry and low fertility is indicated.

##### Management of Planted Areas

Continued management of revegetated areas is critical to insure high plant survival. Grazing of young plants by wildlife and domestic livestock can reduce plant survival. Weedy species may deplete soil moisture to the extent that the vigor of transplants will be reduced. Fencing and repellents control grazing animals in many instances, but the first method is expensive and the latter requires considerably more research before it can be relied upon. The best way to reduce the effects of grazing animals is with large transplants, clear plant interspaces, planting large areas at one time and including several species that are of low to moderate palatability to the problem animals. In years of average or above average precipitation excellent field survival of transplants of adapted species can be achieved without supplemental irrigation. However, during extreme drought years, supplemental irrigation may be essential to insure adequate plant survival. In any case, no additional irrigation should be needed after the first growing season following transplanting.

##### Conclusion

The final revegetation program must be determined by the resource manager; however, the above guidelines for the revegetation program for disturbed areas provide basic information and thus aid in the selection of measures to meet specific site requirements. Each disturbed site must be evaluated prior to the selection of the best method for rehabilitation.

# APPENDIX 10



## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
AREA OFFICE COLORADO-UTAH  
111 FEDERAL BUILDING  
125 SOUTH STATE STREET  
SALT LAKE CITY, UTAH 84103

IN REPLY REFERENCE TO:

(ES)

January 2, 1981

### MEMORANDUM

TO: State Director  
Bureau of Land Management  
Salt Lake City, Utah

FROM: <sup>ACTING</sup> Area Manager  
Fish and Wildlife Service  
Salt Lake City, Utah

SUBJECT: White River Dam Project - Evaluation of Fish and Wildlife Resources under Provisions of Fish and Wildlife Coordination Act

This responds to your request for our assessment of measures needed under provisions of the Fish and Wildlife Coordination Act to prevent or mitigate losses to fish and wildlife resources at the White River Dam Project, Utah.

This technical assistance report constitutes a Fish and Wildlife Service Report as required by the Fish and Wildlife Coordination Act as cited below.

Participation by the Fish and Wildlife Service in planning of the project is authorized under provisions of the Fish and Wildlife Coordination Act (48 Stat., 401, as amended; 16 U.S.C. et. seq.). Section 602 of the act states;

"...whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the United States, or by any public or private agency under Federal permit or license, such department or agency first shall consult with the United States Fish and Wildlife Service, Department of the Interior, and with the head of the agency exercising administration over the wildlife resources of the particular state wherein the impoundment, diversion, or other control facility is to be constructed, with a view to the conservation of wildlife resources by preventing loss of and damage to such resources, as well as, providing for the development and improvement, thereof, in connection with such water resource development."

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The Fish and Wildlife Service also has a direct legal mandate to protect migratory wildlife and endangered species. Authority for this responsibility is contained primarily in the Migratory Bird Treaty Act and Endangered Species Act respectively.

Three endangered fishes, Colorado squawfish, humpback chub and bonytail chub occur within the project affected area. A major issue of the project is whether or not it can be built and operated without the likelihood of jeopardizing existence of the three endangered fishes, especially the Colorado squawfish *Ptychocheilus lucius*. A biological opinion on this matter has been delayed at the request of the State of Utah and the Bureau of Land Management pending completion of ongoing studies on the Green River and a supplemental one year study proposed for the White River. These studies are intended to determine the essential habitat requirements of the squawfish and other endangered fishes.

It is not possible to prepare a complete and definitive Fish and Wildlife Coordination Act Report until the above studies are completed and a biological opinion issued under Section 7 of the Endangered Species Act. There are however, a number of other impacts, primarily to terrestrial wildlife, that can be addressed independently of the endangered fishes issue.

Impact analyses and mitigation recommendations contained in this report are based on the assumption that the project could be built. This might come about either because the ongoing studies reveal a manner in which the project could be constructed and operated without jeopardizing continued existence of the endangered fishes, or because, even though there may be jeopardy, the project is exempted from requirements of the Endangered Species Act through the exemption process contained in the Act or by Congressional action.

It is also possible that none of the above options would materialize. Fish and wildlife mitigation measures for inclusion in the project if it is built are presented at this time to aid the Utah Division of Water Resources in project planning and BLM in preparation of the final environmental statement. However, submission of these recommendations at this time satisfy the provisions of the Fish and Wildlife Coordination Act only and do not satisfy the requirements of Section 7 of the Endangered Species Act.

### Description of the Project Area

The White River flows in a canyon carved through an arid plateau. Adjacent uplands are sparsely covered with predominately shadscale rangeland vegetation interspersed with some juniper. The river meanders within the canyon bottom flood plain which supports a lush bottomland riparian vegetation. The channel divides in numerous places to form islands. Groves of cottonwood trees occur on many of the benches and

## APPENDIX 10 (continued)

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higher islands. Vertical cliffs frequently rise immediately adjacent to the stream or cottonwood groves. The river and its riparian vegetation in the canyon bottom create literally an oasis in the desert. The river is quite turbid much of the year.

The Green River into which the White River empties has been greatly altered in both flows and water quality by Flaming Gorge Dam and reservoir. The White River and the Yampa are the two major tributaries whose relatively natural flows ameliorate effects of Flaming Gorge Reservoir.

### Project Description

The Utah State Division of Water Resources proposes to build an earth fill dam 129 feet high and 2,700 feet long on the White River near Bonanza, Utah. The 105,000 acre-foot reservoir impounded by the dam would be about 11 miles long with a surface area of 1,890 acres. An 8 megawatt hydroelectric plant is proposed at the downstream toe of the dam.

The project purpose is to provide water for industrial development, primarily oil shale and thermal power. Water rights would be retained by the State of Utah and made available for purchase. Water users would provide their own conveyance systems. Active storage capacity would be about 67,000 acre-feet.

Minimum releases at the dam are expected to be 250 cfs except in extremely dry years. This release is for power generation and downstream requirements of Tosco Oil Shale Company and the Uintah-Utey Indian Reservation.

A minimum flow of 50 cfs would bypass the Indian diversion which is about 15-20 miles above the confluence with the Green River. In most years flows are expected to exceed this amount ranging from about 100 to 300 cfs.

### Fishery Resources Without the Project

The turbid waters of the White River within the project affected area provide poor habitat for game fish. Largemouth bass, smallmouth bass and northern pike have been taken occasionally in the White River. However, the channel catfish is the only game fish sufficiently abundant to provide much angling. Fishing effort for catfish is currently low. This is partially attributable to the presence of other fishing waters closer to human population centers and to limited accessibility along the White.

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Common forage fishes in the river include red shiner, speckled dace, flannelmouth sucker, carp, bluehead sucker, roundtail chub and fathead minnow.

The endangered Colorado squawfish, occurs both in the White River and in the Green River at the mouth of the White. The best reproducing population of squawfish known to exist occurs in the Green River near the mouths of the major tributaries, the Yampa, Duchesne and White Rivers. Squawfish have been captured over 100 miles upstream in the White River near the mouth of Piceance Creek in Colorado. One squawfish radio-tagged in the Green River was tracked for 40 miles or more up into the White and may have attempted to spawn at or near the reservoir site.

The endangered humpback chub and the razorback sucker have also been found in the Green River above and below the confluence of the White. The endangered bonytail chub may also exist in the White River.

### Fishery Resources With the Project

The reservoir would probably provide cool water fish habitat and there would be some question as to whether it would be better suited for trout or for warmwater gamefish. Reservoir temperature would be influenced by the type of management selected for the tailwater fishery. Release of predominately cold water from a low level outlet to create a tailwater trout fishery would allow the reservoir to retain more warm water. Conversely, release of predominately warm water from a high level outlet to favor native fishes in the tailwater would allow the reservoir to retain more cold water.

Aquatic habitat of the fluctuating reservoir would probably be mediocre in quality but would supply considerably more fisherman-days of angling than is provided by the existing stream habitat. However, the relatively barren, sloping sides of the fluctuating reservoir would provide a much less interesting and esthetically pleasing setting for the fisherman than does the existing varied scenery and abundant wildlife of the river. Rough fish would almost certainly become a problem in the reservoir competing with game species.

Stabilization of flows and sediment trapping action of the reservoir would improve downstream habitat for game fish. A trout fishery could probably be established for at least 10 miles below the dam, possibly more. Access to the river is limited except by raft or canoe. Therefore, fisherman use would be largely dependent upon adequate flows for a float trip. This would require a minimum flow of about 400 cfs. This is also approximately the flow required to maintain water over most of the productive riffle areas.

Downstream changes which favor establishment of gamefish habitat are almost certain to adversely affect habitat for the endangered Colorado squawfish and humpback chub and the razorback sucker which are endemic species adapted to the existing warm, turbid stream habitat. Analysis of exact impacts on the squawfish and possibly the bonytail chub, and humpback chub will be delayed pending completion of current studies and issuance of a biological opinion.

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### Wildlife Without the Project

Much of the wildlife found in the general area is dependent at least seasonally on the river and its adjacent riparian habitat. Riparian zones constitute one of the most productive habitat types in the nation, supporting greater numbers and diversity of wildlife than any other type.

Riparian habitat of the White River is particularly significant. In the surrounding expanse of arid and nearly treeless rangeland the stream-side cottonwoods and other timber provide the only nesting, perching and roosting habitat for many raptors and other birds. Adjacent cliffs also provide important nesting habitat for raptors. The river, riparian vegetation and adjacent cliffs provide habitat for wintering and migrating bald eagles. Canada geese and some ducks nest along the stream banks and on islands. Additional waterfowl use the river mainly during spring and fall migration. Great blue herons nest and roost in the cottonwood groves and feed along the river.

The canyon floor of the White River within the project area is highly productive for wildlife compared to many other Utah river canyons primarily because of the breadth and flatness of its flood plain and the many meanders of the stream within the flood plain. For example, the reservoir would be about 11 miles long but this area contains over 13 miles of stream because of the looping, meandering course of the river.

The deep moist soils of the flood plain habitat support a more stable prey base, (predominantly white footed mice), than do the dry, adjacent uplands where small mammal populations fluctuate widely with weather cycles. The bottomlands are therefore especially important to raptors in years when the upland prey base is low. This often occurs in drought years.

Raptors nesting or roosting in or adjacent to the riparian habitat, or using it as a primary hunting area are listed below:

- turkey vulture
- Cooper's hawk
- red-tailed hawk
- golden eagle
- bald eagle
- marsh hawk
- osprey
- kestrel
- great horned owl
- long eared owl
- short eared owl
- screech owl

The goshawk, rough-legged hawk and hald eagle (an endangered species) are winter residents. The Swainson's hawk, ferruginous hawk (a species of high Federal interest), peregrine falcon (an endangered species), and merlin occur as seasonal transients.

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There have been confirmed sightings of the endangered peregrine falcon in the reservoir site and the availability of cliff nesting sites in close proximity to a prey base would seem to make the area suitable for reproduction. However, no evidence of an active eyrie has been found thus far.

In addition to raptors, 119 other species of nongame birds, mainly passerines, occur in the project area. All but 10 of these species depend on the White River for nesting, foraging, water, or as a migratory rest stop. Twelve species occur only in riparian habitat similar to that along the White River. Some predators and numerous small mammals also are supported by the bottomland habitat.

The White River supports a high beaver population. These mammals dwell in dens in the river banks rather than building dams. The riparian bottoms within the reservoir site support a mule deer population ranging from 150 to 250 animals for about nine months of the year. The lush vegetation and readily available water make it a highly productive area for fawning and rearing of young deer. During mid winter many of the deer move from the canyon bottom up to the adjacent uplands. The canyon bottom becomes extremely cold in mid winter because of temperature inversions. At this same time snow often provides a source of moisture in the normally dry upland areas.

### Wildlife With the Project

The major loss of terrestrial wildlife would result from the inundation of 990 acres of riparian habitat along 13 miles of the river above the dam and from modification of additional riparian habitat along 45 miles of river downstream to the confluence of the Green River. Existing riparian habitat is created and maintained by the alternate scour and fill action of the wide seasonal fluctuation in streamflow. Reduction and stabilization of flows together with reduced sediment load will cause gradual changes in vegetation, probably favoring the exotic salt cedar over more desirable native species such as cottonwood. The cottonwood groves are important to many species of wildlife, especially beavers, raptors and other birds. Their loss or reduction would be a serious adverse impact.

The islands of the White River provide important Canada goose nesting habitat. For successful goose nesting at least a portion of an island must be free of tall vegetation. Loss of the scouring action of peak spring flows will probably allow shrubby vegetation to invade portions of islands and shoreline now kept barren or in short herbaceous cover. Reduced flows also will probably fail to maintain separation of some islands from the mainland shore, thus converting them to peninsulas vulnerable to mammalian predation.

Terrestrial wildlife losses are summarized below:

Mule deer - The average population of 200 deer within the reservoir area would be totally lost. Fawn production that sustains this herd is dependent on the river bottom habitat. The bottomlands also support the

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200 deer for nine months of the year. There is no way the adjacent sparsely vegetated and waterless uplands can sustain the deer population displaced from the highly productive bottomlands. Included in the loss is an average annual production of 68 fawns.

Beaver - The estimated maximum population of 176 beavers within the reservoir area would be totally lost.

Eagles - The number of bald eagles making winter use of the reservoir area ranges from 3 to 10. A few golden eagles use the area year-round. Eagles use the riparian timber for roosting and perching and do some hunting along the river. However, a considerable portion of their hunting activity occurs on adjacent uplands.

Project impacts on the bald eagles are difficult to evaluate and may be about neutral. Loss of riparian roosting, perching and feeding habitat would be an adverse impact. However, this loss may be offset by other beneficial effects. With the project in operation at least a portion of the White River would remain unfrozen in the winter possibly providing a new prey base, and the reservoir may provide some food when it is ice free. Loss of nesting and feeding habitat by inundation and human disturbance would be detrimental to the golden eagle.

The most serious impacts on raptors would be loss of nesting, roosting and feeding habitat for the 12 species associated primarily with the riparian zone, and the loss of prey base during drought conditions when the riparian zone becomes a prime hunting area.

Riparian vegetation is a specialized habitat that is in critically short supply. This fact, together with the territorial behavior of most nesting raptors, makes it probable that riparian habitat above and below the reservoir area is used to nearly its carrying capacity. Therefore, it is likely that inundation would ultimately cause the total loss of at least the raptors nesting in the riparian zone.

Canada Geese - Nesting habitat for about 29 Canada geese along 13 miles of river would be completely eliminated. Nesting habitat for about 115 geese along 45 miles of river below the dam would be reduced in productivity, and could be eliminated.

Passerine Birds - Populations of the 12 species entirely dependent on riparian habitat obviously would be completely eliminated within the reservoir site. Populations of the other 97 species making seasonal use of the reservoir area would be reduced by an undetermined amount.

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### Discussion

The riparian habitat along 13 miles of river within the reservoir site will be totally lost along with much of the wildlife it supports, notably at least 200 mule deer, nesting and migrating waterfowl, numerous raptors including eagles, beavers, and other wildlife. Bottomland riparian habitat is a unique, highly productive type that is extremely limited in occurrence.

Because of the limited occurrence and specialized nature of riparian habitat, replacement in kind is not feasible. There may, however, be opportunities for partial replacement of equivalent productivity for some species in other habitat types.

Loss of the highly productive, nearly year-round deer habitat within the reservoir area cannot be replaced but should be mitigated. In much of the remainder of the Uintah Basin, winter range is the critical factor limiting deer populations. Therefore, it would be possible to provide an equivalent amount of productivity elsewhere in the basin through acquisition and improvement of deer winter range.

A typical carrying capacity for good quality mule deer winter range is about one deer per eight acres. On this basis, approximately 1600 acres of winter range would equal the productivity of habitat eliminated by the project.

High quality deer winter range normally also supports a good population of small mammals which provide a prey base for eagles and other raptors. Therefore, some raptor mitigation would occur incidental to deer mitigation. Raptor losses could be further mitigated if artificial perches for hunting raptors were provided in the deer mitigation area.

From a biological standpoint the most desirable approach to mitigating the loss of goose nesting habitat would be preservation or improvement of habitat on the remaining islands. However, it is difficult to predict what might be required to accomplish this, if it would be feasible, or what the cost would be. It is possible this objective might be accomplished by a minimal amount of vegetation control. However, it is also possible that expensive channel modifications might be required repeatedly to maintain separation of islands from the main shore. Also, in at least some cases ownership of the islands could present a management problem.

An alternative to management and maintenance of islands for goose nesting would be acquisition and development of approximately 100 acres of marshland. Although this is less desirable biologically than the dispersed nesting on islands, it may be a more realistic and attainable mitigation measure. The cost would be far more predictable. This measure would benefit some waterfowl but would probably be only marginally beneficial for Canada goose nesting.

## APPENDIX 10 (continued)

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Management of an isolated 100 acre tract would not be practical. Therefore, the mitigation marshland tract should be closely associated with an existing managed waterfowl area.

There is no feasible way to mitigate the remainder of terrestrial wildlife losses. The loss of habitat for heavers, raccoons, small mammals, herons, shore birds, passerine birds, coyotes and other predators would be an unavoidable loss. The rich and diverse riparian ecosystem is a unique resource, the loss of which cannot be truly replaced.

Another unavoidable loss would be the greatly reduced potential for human enjoyment of the rich and varied wildlife resource in a remote, uncrowded setting while floating the river by canoe or raft.

### Recommendations

The Fish and Wildlife Service recommends that, if the project is authorized right-of-way permits issued for the project be conditioned to provide fish and wildlife mitigation measures listed below.

We emphasize that these recommendations are based on needs of sport fish and terrestrial wildlife. It is possible that some or all of these recommendations could be nullified or require change as a result of the biological opinion under Section 7 of the Endangered Species Act.

1. The dam should be provided with multiple level outlets to control temperature of downstream releases. The currently proposed outlet for the power plant which would draw water from elevations 4920 to 4950 would be satisfactory as a low level outlet. Based on Utah Division of Water Resources Temperature studies this outlet would release water at temperatures ranging from about 52° F to 63° F with temperature being about 57° under average drawdown conditions. This range of temperatures would be satisfactory for a cold water stream fishery.

An additional higher level outlet would be needed to provide warm water releases if the tailwaters are to be managed primarily for preservation of native fishes. An outlet located at elevation 4975 would be 20 feet below the predicted average summer water level and would discharge water at a temperature of about 67°F based on the same Utah Division of Water Resources Temperature study. This temperature would probably be satisfactory for warm water releases for downstream protection of endemic fishes based on present knowledge. An outlet at higher elevation would provide more assurance of warm water releases if this is engineeringly feasible.

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Outlet design should provide capability for mixing water from the two levels to provide intermediate temperatures.

2. Exact minimum flow recommendations cannot be made until completion of detailed studies to determine streamflow requirements of endangered and threatened fishes. These studies are scheduled for completion in January of 1982. Also, exact flow requirements for game fish are difficult to predict until it is known what changes in channel morphology and substrate may result from the project, and what fishes are to be the target species for management.

The Utah Division of Wildlife Resources has developed methodology for determining flows needed to maintain historic aquatic habitat, (Utah Water Records Methodology), a copy of which is included as Appendix 1. Minimum flows calculated for the period of record using the above methodology may be summarized as being 395 cfs in the summer and 336 in the winter for average or better water years, with flows proportionately reduced in below average water years but never less than 120 cfs. Complete tabulation of monthly minimum flows for the period of record calculated by the above method is contained in Table 1 of the appendix.

Flow simulations contained in Appendix 1 are intended to serve as an interim guide for use in project design as to the general magnitude of flows likely to be needed to maintain aquatic habitat. Exact volume and timing of minimum flows would vary depending on the species of fish, the management objective, and altered channel morphology and substrate resulting from the project. Further information on habitat needs gained from ongoing studies could also influence flow recommendations.

3. It is important to consider that Tosco would be withdrawing water from the river about 10 miles downstream from the dam, and the Utah-Urday Indian Reservation would divert an additional amount below that point.

It is essential that the project be designed in such a manner that flows to be recommended after completion of the ongoing studies can be accommodated plus the flows required for Tosco. We believe these flows are likely to fall in the 395 cfs range plus flow requirements for Tosco.

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3. Approximately 1600 acres of deer winter range should be acquired for the Utah State Division of Wildlife Resources. This could be accomplished by purchase of private land or possibly by making suitable State owned lands available for that purpose. Controlled livestock grazing would be permitted in either case. Requirement for 1600 acres is based on an assumption of 8 acres per deer carrying capacity. If the carrying capacity of the mitigation tract is greater, the area could be smaller. Likewise, if the mitigation tract has less potential capacity the area would have to be larger.
4. Artificial perch structures should be provided on the deer mitigation tract to improve it as a hunting area for raptors if natural perches are not adequate and the area is otherwise suitable for raptors. This should be tried on a small scale initially and monitored to determine effectiveness of the measure.
5. If monitoring of goose nesting habitat on downstream islands confirms the expected deterioration resulting from altered streamflow, an effort should be made to determine if any measures are feasible to correct the problem, and any viable measures implemented. One potential measure would be construction of artificial nesting structures either along the White River or in suitable habitat elsewhere. Approximately 9 islands occur above the reservoir in Utah and about 21 downstream from the dam.

If attempts to maintain island nesting habitat should prove unsuccessful, another alternative would be acquisition and development of approximately 100 acres of marsh habitat closely associated with an existing managed waterfowl area.

This technical assistance report has been prepared in cooperation with the Utah Division of Wildlife Resources (UDWR) as required by the Fish and Wildlife Coordination Act. It is recognized that cooperation with the UDWR does not imply concurrence by the State of Utah.

Recommendations contained herein are based on the best projection of project impacts possible in light of existing knowledge. Some recommendations may require modification or refinement in light of future experience and knowledge. It will be necessary to maintain continuing monitoring of the results. Furthermore, as the project proceeds additional reports or memorandums may be required to fully satisfy the Coordination Act requirements.

The opportunity to offer these comments is appreciated.

*Jim Fiedale*

APPENDIX 11 Page 1.

### RECOMMENDATION FOR MINIMUM DAILY MEAN DISCHARGES FOR RETENTION OF HISTORICAL FISH HABITAT

Recommended minimum daily mean discharges for the retention of historical fish habitat at the proposed damsite were computed using the Utah Water Records Methodology (Geer 1980). This methodology is based on a summarization of published water records and provides separate streamflow recommendations for summer and winter. Winter is defined as the full 6-month period from October 1 through March 31; summer is from April 1 through September 30. Until now, this methodology has been used only for Utah trout streams.

In this methodology, the lowest monthly mean (arithmetic) discharge in each of the 6-month periods (winter and summer) in each year is summed over the period of record. Each season thus has a sum of monthly mean discharges from which is computed a single, grand mean discharge for the period-of-record. The two grand mean values are the recommended minimum daily mean discharges for winter and summer in average or better water years. By this methodology, the recommended minimum daily mean discharges (for average or better water years) are 336 and 395 ft<sup>3</sup>/s for winter and summer, respectively.

In low water years, however, the recommended daily mean discharges are prorated using mean values according to the degree of shortage, but in no case are less than the mean 7-day, 10-year minimum daily mean discharge (the base flow approximation). The proration is done on a month-to-month basis using the best prediction of the next month's arithmetic mean discharge. For a particular month, the ratio of the predicted monthly mean discharge to the period-of-record monthly discharge is multiplied by the recommended minimum daily mean discharge for the average water year. This proportion of the mean year recommended flow or the mean 7-day, 10-year minimum daily mean discharge, whichever is greater, is the revised minimum daily mean discharge recommended for water-short years. The following example will clarify the proration procedure.

In the White River at Watson, the period-of-record (water years 1931 through 1979) mean discharge in March is 566 ft<sup>3</sup>/s; the mean 7-day, 10-year minimum daily mean discharge is 326 ft<sup>3</sup>/s. From the Utah Water Records Methodology, the recommended minimum daily mean discharge for the winter is 336 ft<sup>3</sup>/s. If, in February of any year, the predicted March mean discharge would be reduced to 226 ft<sup>3</sup>/s, as computed from the following:

$$\left[ \begin{array}{c} \text{Predicted monthly mean Q} \\ \text{FOR Monthly mean Q} \end{array} \right] \times \left[ \begin{array}{c} \text{Recommended minimum daily mean Q} \\ \text{for average water year} \end{array} \right] =$$

Revised recommended minimum daily Q for water-short years, or

$$\left[ \begin{array}{c} 380 \text{ ft}^3/\text{s} \\ 566 \text{ ft}^3/\text{s} \end{array} \right] \times 336 \text{ ft}^3/\text{s} = 226 \text{ ft}^3/\text{s}$$

# APPENDIX 10 (concluded)

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A predicted monthly mean discharge of 202 ft<sup>3</sup>/s would result in a revised recommendation of exactly 120 ft<sup>3</sup>/s. Below 202 ft<sup>3</sup>/s, the proportion formula would not be used and the revised recommended flow would remain at 120 ft<sup>3</sup>/s.

In the White River, the recommended minimum daily mean discharge of 336 ft<sup>3</sup>/s would have been reduced in 31 of the 45 months of March from 1931 through 1979.

The base flow constraint protects a stream ecosystem from excessive degradation in the event that initial methodology results lead to unrealistically low minimum flow recommendations. This constraint is applied until more comprehensive population and habitat surveys justify the provision of lower discharges.

Under the above-stated procedures, the recommended minimum daily mean discharges in the period-of-record would have been those shown in Table 1. The recommended flows should be interpreted as seasonal minimum daily mean values necessary for retention of historical fish habitat. However, the percentage of historical habitat retained is not actually estimated. They are not optimal fish production flows and should not be presented as a permanent operating streamflow regime. Derived flow recommendations are reconnaissance grade only and should be supplemented or replaced by values derived from a more comprehensive field methodology when impact analyses or year-round operating streamflow regimes are required.

The discharge recommendations are for protection of the endangered and nonendangered fish species presently inhabiting the White River in Utah. It is assumed that the channel morphology and water quality will remain the same with the project as without. The recommendations do not apply to a situation in which the water quality, channel morphology and target fish species are dramatically changed as may occur if cold, clear reservoir discharges create narrower, deeper channel and result in establishment of a trout fishery. Such a situation would require new and separate flow recommendations developed under post-project conditions.

## Reference:

Geer, W. H. 1980. Evaluation of five instream flow needs methodologies and water quantity needs of three Utah trout streams.

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Table 1. Recommended minimum daily mean discharges (ft<sup>3</sup>/s) in the White River, near Natron, for retention of historical fish habitat; simulation under period-of-record conditions.

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1931	336	336	221	287	321	319	395	271	227	172	317	371
1932	328	336	336	336	336	336	395	395	395	395	395	395
1933	336	336	336	336	336	336	395	299	395	334	395	363
1934	305	336	336	336	336	254	350	178	120	120	178	272
1935	221	244	313	336	319	236	239	266	395	317	269	359
1936	255	319	316	336	327	236	395	395	339	363	395	364
1937	295	279	276	157	248	313	226	348	220	395	341	395
1938	336	276	265	282	319	336	395	395	395	395	395	395
1939	336	287	284	323	308	336	395	391	259	187	278	395
1940	336	319	320	336	327	248	380	395	213	171	213	395
1941	336	315	285	293	336	310	345	395	395	395	395	395
1942	336	336	336	336	336	336	395	395	395	395	391	378
1943	336	336	336	336	336	328	395	236	322	304	395	329
1944	272	328	334	302	330	319	293	395	395	390	271	249
1945	247	287	313	336	336	278	304	395	389	395	395	388
1946	317	336	322	336	319	300	395	287	247	206	395	344
1947	336	336	336	267	299	336	362	395	395	395	395	395
1948	336	336	336	336	327	336	395	395	338	338	395	310
1949	305	321	303	241	211	336	395	395	395	395	395	395
1950	336	336	328	328	268	296	342	266	395	371	298	395
1951	316	336	336	292	336	265	268	333	395	395	395	349
1952	321	326	329	323	298	204	395	395	395	395	395	395
1953	330	311	336	336	336	336	395	395	395	395	395	395
1954	270	336	336	336	336	242	354	290	120	180	196	395
1955	336	285	282	258	290	336	319	366	280	152	302	205
1956	261	307	334	323	299	336	311	395	314	216	311	213
1957	247	294	284	336	336	303	302	321	395	395	395	395
1958	336	336	336	336	336	336	395	395	395	395	395	395
1959	336	336	336	336	336	321	233	129	357	293	395	395
1960	336	324	318	268	301	336	395	291	350	210	205	312
1961	271	304	295	299	298	226	225	272	239	157	271	395
1962	336	336	336	336	336	336	395	395	395	395	395	395
1963	336	336	336	336	336	236	298	300	120	120	373	395
1964	190	276	243	275	290	257	311	354	368	296	363	259
1965	257	291	336	336	336	331	360	395	395	395	395	395
1966	336	336	336	336	319	336	331	301	120	120	240	228
1967	295	251	298	292	271	284	250	282	377	299	247	322
1968	280	283	285	288	312	242	294	301	395	363	395	354
1969	330	336	336	336	295	325	395	395	276	328	363	395
1970	336	336	336	336	336	249	277	395	395	395	395	395
1971	336	336	336	336	333	336	395	362	395	395	395	395
1972	336	336	336	336	336	258	310	302	395	220	229	354
1973	336	336	336	336	329	325	288	395	395	395	395	395
1974	336	336	336	336	287	336	395	395	368	358	337	305
1975	336	336	285	264	336	332	319	367	265	220	304	282
1976	336	336	294	335	326	318	297	320	395	395	395	395
1977	301	293	282	317	299	251	120	120	120	187	208	395
1978	212	264	266	296	262	278	369	392	395	395	344	388
1979	295	334	336	306	243	313	395	395	395	395	395	310

## APPENDIX 11

### CULTURAL RESOURCES MEMORANDUM OF UNDERSTANDING

#### WHITE RIVER DAM PROJECT ENVIRONMENTAL IMPACT STATEMENT BETWEEN

#### THE BUREAU OF LAND MANAGEMENT AND

#### THE UTAH STATE HISTORIC PRESERVATION OFFICER

#### I. PURPOSE

The Bureau of Land Management, hereinafter referred to as the Bureau, is preparing the White River Dam Project Environmental Impact Statement (White River EIS) under the provisions of the National Environmental Policy Act of 1969. The Bureau has determined that cultural values could be damaged or lost as a result of actions proposed in the White River EIS. The following kinds of actions are proposed on public lands administered by the Bureau:

- a. Earth dam
- b. Hydro-electric power generator
- c. Reservoir
- d. Pumping facilities
- e. Power transmission line
- f. Access roads
- g. Recreation sites
- h. Water pipeline

The Utah State Historic Preservation Office, hereinafter referred to as the State, is interested in assuring that cultural values in Utah be protected. The Bureau and the State have consulted and agree as to the measures, outlined in this agreement, which should be undertaken to protect these values should authorization be granted to use public lands in Utah administered by the Bureau for the purpose of any of the above mentioned proposed actions. In

this agreement, "cultural resources" means data and sites which have archaeological, historical, architectural, or cultural importance and interest.

Investigators will be qualified to evaluate these "cultural resources." Qualifications of investigators will be submitted to the State Historic Preservation Officer.

#### II. AUTHORITY

This agreement is authorized under the Federal Land Policy and Management Act of 1976 and the National Historic Preservation Act of 1966. It is in accord with Bureau policies and programs. It does not abrogate nor amend any other agreement between the Bureau and the State.

#### III. RESPONSIBILITIES AND PROCEDURES

The Bureau will comply with 36 CFR 800 in identifying sites which are listed in or eligible for inclusion in the National Register of Historic Places.

A. As part of the planning and environmental analysis required prior to any decision to authorize rights-of-way for the proposed White River Dam Project, the Bureau will search for archaeological and historical literature concerning the White River area. Literature and records searches have been conducted for all public lands that would be affected by the White River proposal.

B. After completing the planning and environmental analysis process, should the proposed management be implemented, the Bureau will inform project participants of, monitor compliance with, and enforce the following stipulations:

## APPENDIX 11 (continued)

1. Prior to initiation of ground-disturbing activities, literature searches and intensive surveys will be undertaken on all areas which would be disturbed.

2. Wherever possible and feasible, cultural resources will be avoided by construction and related activities. This will be accomplished mainly by rerouting linear facilities such as pipelines and transmission lines, and adjusting the location of other facilities. Significant cultural resources facing inundation due to proposed reservoir construction will be salvaged to recover data that would otherwise be lost.

3. A professional archaeologist may be required to be present when ground-disturbing operations are underway.

4. Subsurface cultural resources that are encountered during any construction will be salvaged if there is no other recourse in such a situation.

C. Wherever it is not possible and feasible to avoid sites that contain cultural values, the Bureau will consult with the State Historic Preservation Officer to determine the most satisfactory means of mitigating damage, as required by 36 CFR 800.

D. The Bureau will provide cultural resource reports, technical reports, and other pertinent material to the State.

F. The attached list identifies the specific actions that the Bureau anticipates will be included in the White River EIS. The list may be brought up to date, as necessary, without amending this agreement in any way.

### IV. IMPLEMENTATION

A. This agreement will become effective on the date of the last signature on this agreement.

B. Either party may request revision or cancellation of this agreement by written notice, not less than 30 days prior to the time when such action is proposed.

C. Any problems resulting from this agreement which cannot be resolved by the Bureau and the State will be referred to the Secretary of the Interior and the Advisory Council on Historic Preservation.

Date Jan 21, 1980  
Date Jan 29, 1980

Sam J. Wick  
Utah State Director  
Bureau of Land Management  
Department of the Interior  
William J. Smith  
Utah State Historic Preservation Officer

## APPENDIX 12

### APPENDIX 12

#### Bingham Engineering Site Investigation Summary Report

The Site Investigation Report, White River Dam Project (Bingham Engineering, 1981b) concluded that: "The purpose of this investigation was to assess the technical feasibility of building a safe structure and to provide data necessary for final geotechnical analyses and design of the White River Dam and other appurtenant features.

This report presents the results of an investigation of the site foundation, reservoir basin conditions, reservoir impacts, and the location of construction materials."

The principal results, conclusions, and recommendations are as follows:

1. No geologic conditions have been discovered that might preclude the construction of a safe embankment dam and related structures with proper design provisions and adequate construction control.
2. The site is located in an area of low seismicity with relatively minor risk of seismic damage. No active faults have been located in the general project area. The nearest known inactive fault is several miles from the site. Appropriate seismic loadings, although minor, should be used for design.
3. The exposed Uinta Formation is jointed and weathered to various depths. High localized permeabilities have been measured. The joints tend to close with depth with a resulting decrease in permeability.
4. The bedrock foundation at the dam site will require a considerable grouting effort to assure protection of the foundation from the effects of stress relief, weathering, and the increased hydraulic gradients from the proposed reservoir.
5. The right abutment will require keying to provide an acceptable rock contact. Some dental concrete and slush grouting will be needed at the core contact.
6. The maximum depth to bedrock at any point under the dam is apparently less than 40 feet.
7. The foundation for the embankment will be founded partly on the gravels, sands, and sandy silts of the floodplain alluvium, with other portions of the dam directly on bedrock or terrace gravels. Some of the floodplain soils should be removed, compacted, or consolidated.
8. Permeability of the river bottom alluvium is high and will require a cutoff to bedrock to prevent piping and high hydrostatic pressures in the downstream foundation.
9. Earth construction materials (silts, sands, and gravels) for the embankment are available within the reservoir basin and adjacent terrace areas. Some of the large volume of rock generated from spillway and access road excavations can be used effectively in the embankment.
10. A limited source of impervious, moderately plastic soil has been located approximately 15 miles from the site. If the core zone is not constructed of a plastic soil, it is recommended that the best available plastic material be used in the bottom of the cutoff trench and at the contact of the rock abutments and core zone. A minimum 5-foot thickness is recommended.
11. Although much of the sandstone, siltstone, marlstone, and shale of the Uinta Formation weathers quite rapidly, a thick zone (20-40 feet) of the more durable sandstone should provide adequate erosion protection. Some maintenance of the upstream slope should be anticipated.
12. Outlet and spillway structures will be founded directly on rock.
13. The rock formations of the abutments are sufficient in strength and durability to provide a stable foundation for the embankment.
14. Some minor leakage of the abutments may occur, but will not present a danger to the structure. Most of the leakage from the reservoir will move internally down-dip to the northwest through joints in the Uinta Formation.
15. The Bird's Nest Aquifer is effectively isolated from the river except in the outcrop areas. Fine-grained beds in the lower part of the Uinta formation and the upper part of the Parachute Creek Member reduce vertical permeability to a very low range. Vertical jointing appears to reduce significantly with depth.
16. The Bird's Nest Aquifer will experience a greater recharge due to the reservoir, but probably less than 700 acre-feet per year. This additional recharge should not present significant dewatering problems for oil shale mining. Leakage into the Bird's Nest Aquifer will probably be reduced after a period of years due to sedimentation within the reservoir.
17. The reservoir will have minor, if any, effects on the Douglas Creek Aquifer.
18. Gilsontite veins are not exposed in the reservoir basin. It is doubtful that any significant additional groundwater leakage into the gilsontite veins will occur.
19. The near surface groundwater in the alluvium and rock is generally effluent and tributary to the river.

### APPENDIX 12 (concluded)

# GLOSSARY

**ACRE-FOOT.** The volume of water (43,560 cubic feet) that would cover 1 acre to a depth of 1 foot.

**ALGAL LIMESTONE.** A limestone composed largely of remains of calcium-secreting algae or one in which such algae serves to bind together the fragments of other calcium-secreting forms.

**AQUIFER.** A water-bearing stratum of permeable rock, sand, or gravel.

**ARMORING.** The process of removing fine particles (sand and clays) from a streambed and leaving the substrate covered with large cobbles and boulders.

**ASYMMETRIC.** One side steeper than the other (as in an asymmetric valley).

**ANIMAL UNIT MONTH (AUM).** The amount of forage required by a cow with a calf, or their equivalent, for one month.

**BORROW MATERIAL.** Excavated material (sand, gravel, etc.).

**COBBLES.** Stones larger than pebbles, smaller than boulders.

**COLIFORM.** Colon (intestinal) bacillus bacteria.

**COLORADO WATER RIGHTS.** Absolute: Under Colorado water law, an absolute water right is a perfected right, with a given priority date, to divert, store, or consumptively use a certain amount of water. To perfect a water right, it is necessary to demonstrate that the water has been put to beneficial use.

**CONDITIONAL.** Under Colorado water law, a conditional water right is a right to perfect a water right or make it absolute. When a conditional water right is perfected, it retains its original priority date.

**CONGLOMERATE.** A coarse-grained sedimentary rock of rounded fragments larger than 2 mm in diameter set in a fine-grained matrix of sand, silt, or any of the common cementing materials. The coarse grains are fragments of pre-existing rocks.

**DOWNSTREAM TOE.** The lowest part of a dam facing in the direction of the streamflow.

**DRAWDOWN.** A lowering of the water level of a reservoir.

**Eocene Epoch.** An early epoch of the Tertiary Period of the Cenozoic Era. It is thought to have covered the span of time between 36 and 58 million years ago.

**FAULT.** The steep slope of a cliff.

**FLOODPLAIN.** Land susceptible to being flood-inundated from any source, including small and often dry watercourses, areas adjoining coastal waters, and areas along rivers, streams, and lakes.

**FORMATION.** The basic rock-stratigraphic unit in the local classification of rocks consisting of a body of rock generally characterized by some degree of internal homogeneity or distinction features.

**FREE-FLOWING RIVER.** Existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway. Although the existence of low dams, diversion works, and other minor structures at the time the river is proposed for inclusion in the National Wild and Scenic Rivers system does not automatically bar its consideration for such inclusion, this shall not be construed, to authorize, intend, or encourage future construction of such structures.

**GILSONITE.** A black, shiny, hard asphalt.

**GROUT.** A thin mortar used for filling spaces.

**HUNTER DAY.** One hunter hunting for a day or a part of a day.

**JOINT.** A fracture in a rock. A joint differs from a fault in lacking displacements on opposite sides of the fracture.

**LIMESTONE.** A sedimentary rock consisting chiefly of calcium carbonate, primarily in the form of the mineral calcite.

**LITHIC SCATTER.** An archaeological site characterized by the presence of flaked tools, chips, cores or flakes only.

**MAINSTEM FLOW.** Movement of the main course of a stream.

**MARLSTONE.** A rock consisting of approximately equal amounts of carbonate and clay.

**OBLIGATE SPECIES.** A species for which a change in habitat will directly influence its population, either favorably or unfavorably.

**OIL SHALE.** A marlstone which is rich in kerogen (distillable hydrocarbons).

**OIL SHALE LEACHATE.** A complex waste including salts, heavy metals, and organic compounds picked up by water that has percolated through processed or unprocessed oil shale.

**100-YEAR FLOOD.** A statistical probability of a flood occurring at a frequency of once every 100 years. The long-term average incidence of the 1-percent-chance flood is once in 100 years.

**PENSTOCK.** A conduit or pipe for conducting water through a dam.

**PHYTOPLANKTON.** Passively floating or weak swimming minute plant life found in a body of water.

**PRIMITIVE RECREATION VALUES.** Environmental features that enhance the quality of unconfined, undeveloped, and unimproved recreation (i.e., canoeing, hiking, backpacking, etc.). A general description would be highly scenic, undeveloped lands essentially removed from the effects of civilization with excellent opportunities for solitude.

**PROTOHISTORIC.** Of a time that immediately antedates recorded history.

**QUATERNARY PERIOD.** The second period of the Cenozoic Era. It is thought to have covered the last two or three million years.

**RECREATIONAL RIVER AREAS.** Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

**RECONNAISSANCE LEVEL STUDIES.** Undetailed studies used for preliminary examinations and comparisons.

**REENTRAINMENT.** The process whereby silt, sand, and clay particles previously deposited in a streambed are again collected and transported by water flow.

**RIFLE.** A section of stream in which the water is usually more shallow and the current is of greater velocity than in the connecting pools; a shallow extending across a streambed and causing broken water.

**RIPARIAN.** Of or relating to or living or located on the bank of a watercourse (river or stream).

**RIPARIAN HABITAT.** A specialized form of wetland restricted to areas along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams; also, periodically flooded lake and reservoir shore areas, as well as lakes with stable water levels with characteristic vegetation. This habitat is transitional between true bottom land wetlands and upland terrestrial habitats and, while associated with water courses, may extend inland for considerable distance.

**RIP-RAP.** A sustaining wall of large boulders thrown together without order as an embankment slope to prevent erosion.

**RIVER VALLEY ALLUVIAL DEPOSITS.** Loose rock material deposited over time in the floodplain of a meandering river.

**ROCK STRUCTURE.** The general geometric arrangement of rock masses following such processes as folding, faulting, jointing, etc.

**RUN.** A section of stream where the water surface is not broken, but is shallow and has a fast velocity.

**SCENIC RIVER AREAS.** Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

**SCOURING.** The removal of mud (silt, clay, and sand particles) deposits from a streambed.

**SEDIMENT LOAD.** The material (solid particles and dissolved compounds) transported by a river.

**SEDIMENTATION.** The filling in of a reservoir by the sediment load that is dropped from the inflowing water as it slows and stills.

**SEISMIC.** Pertaining to an earthquake or earth vibration.

**SEISMIC EVENT.** An earthquake or earth tremor caused by earth motion which is measured using the Richter Scale.

**SENSITIVE SPECIES.** Any species which may be a candidate for the Federal Threatened and Endangered Species List; a rare or imperiled species whose small populations are so widely dispersed or ranges so narrowly restricted that any reduction in numbers or changes in habitat might lead toward extinction; a species whose numbers are declining so rapidly because of one or more factors such as disease, grazing, predation, etc., that official listing may become necessary as a conservation measure.

**SETS (OF JOINTS).** Two or more parallel joints.

**SHALE.** A rock composed of particles less than 1/256 mm in diameter in thin layers.

## GLOSSARY

**SILTSTONE.** A rock composed of silt-size (1/16-1/256 mm) and clay size (less than 1/256 mm) particles.

**SLUICeway.** An artificial channel into which water is let by a gate for controlling its flow or changing its direction.

**SPOIL.** Dirt and rock material excavated from mining, dredging, or digging activities.

**STILLING BASIN.** A small, deep water body used for energy dissipation.

**STRATA.** Plural of stratum. Stratum is a tabular or sheet-like layer of sedimentary material.

**TAILWATER.** Water below a dam.

**TELEMETRY.** Use of small radios placed on animals to monitor their movements.

**TERRACE.** A bench-like structure, usually along both sides of a stream valley (stream terrace).

**TERRACE DEPOSITS.** Loose alluvial material resting on a terrace.

**THERMAL STRATIFICATION.** The layering of water in a lake or reservoir into a lower, colder, heavier oxygen poor zone of mid-die transition, and upper warmer, lighter oxygen rich zone that is subject to wind action.

**TOTAL DISSOLVED SOLIDS (TDS).** The total quantity (mg/l) of dissolved materials in water.

**TRACE ELEMENTS.** Chemical elements present in minute quantities.

**TRANSMISSIVITY.** The rate at which water is passed through an aquifer.

**TRASH RACKS.** Large screens used to prevent debris from being sucked into the penstocks of a dam.

**TUFF.** A compacted deposit of volcanic ash and dust that may contain up to 50 percent sediments such as sand and clay.

**WEATHERING.** The breakdown near the surface of rock and soil by physical (such as freezing) and chemical (such as dissolving) processes.

**WETLAND.** Land areas characterized by the presence of water at or near the surface during portions of the year; usually characterized by vegetation adapted to wet conditions.

**WILD RIVER AREAS.** Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted.

**ZOOPLANKTON.** Passively floating or weakly swimming minute animal life found in a body of water.

## LIST OF ABBREVIATIONS

ac. ft.: acre-foot  
AUM: animal unit month  
bpd: barrels per day  
BLM: Bureau of Land Management  
Btu: British thermal unit  
C: degrees of Centigrade  
cfs: cubic feet per second  
cm: centimeter  
CRPS: Colorado River Storage Project  
DOE: Department of Energy  
EIS: Environmental Impact Statement  
EPA: Environmental Protection Agency  
F: degrees of Fahrenheit  
FERC: Federal Energy Regulatory Commission  
FWS: Fish and Wildlife Service  
ha: hectare  
HCRS: Heritage Conservation and Recreation Service  
km: kilometer  
kV: kilovolt  
KWH: kilowatt hours  
l: liter  
MFP: Management Framework Plan  
m: meter  
mm: millimeter  
mg/l: milligrams per liter  
mgd: million gallons per day  
MW: megawatt  
NOAA: National Oceanic Atmospheric Administration  
NEPA: National Environmental Policy Act  
ORV: off-road vehicles  
TDS: total dissolved solids  
UDWR: Utah Division of Wildlife Resources  
USBR: U.S. Bureau of Reclamation  
USDA: U.S. Department of Agriculture  
USDI: U.S. Department of Interior  
USGS: U.S. Geological Survey

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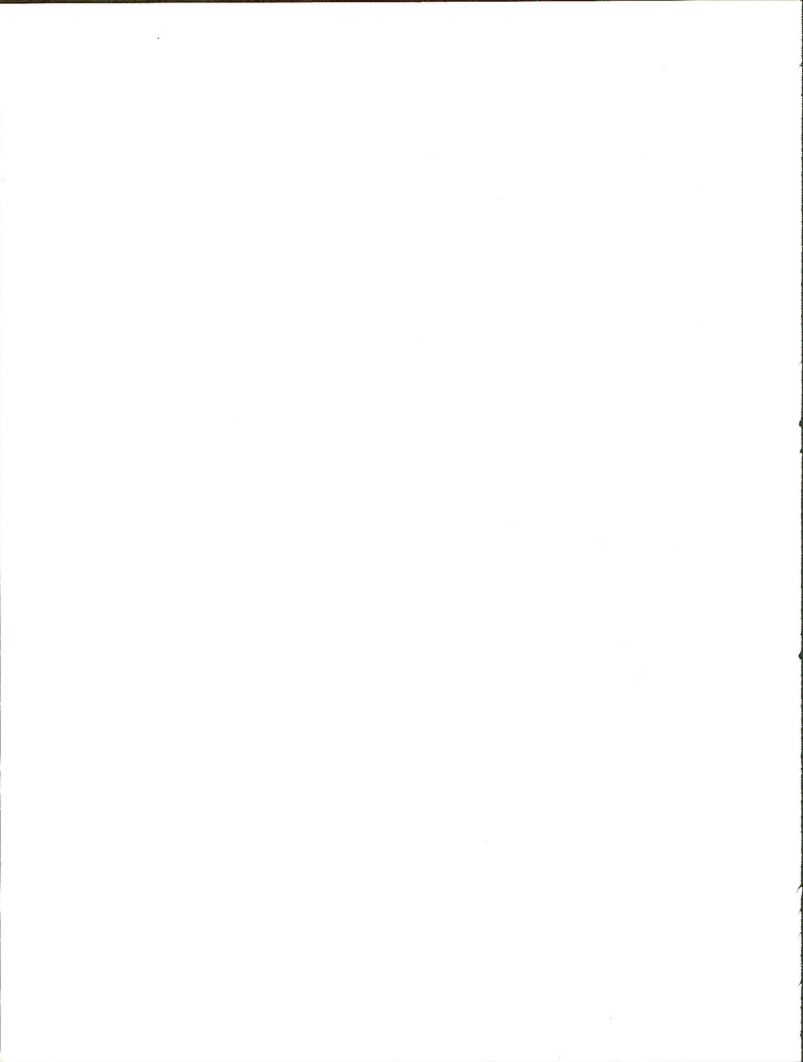
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